

# A revision of the genus *Dnopherula* Karsch (Orth. Acridoidea)

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## SUMMARY.

The position of the genus *Dnopherula* within the *Aulacobothrus* group in the Ethiopian region is clarified. The genus is taxonomically revised, a key to the species of the genus is given and five new species are described. A list of the species of the genus *Rhaphotittha* is also given.

## INTRODUCTION.

The *Aulacobothrus* group is here considered as in Dirsh 1958. This group of genera of the subfamily *Truxalinae* has attracted the attention of several authors for the past sixty years and, to it, several generic names have been attributed. These generic names have been re-arranged into several different computations at various times in the group's history. Furthermore the species, particularly in the Ethiopian region, have been greatly confused. It is therefore obvious that some form of revisionary work is necessary and this paper is an attempt to revise the group in the Ethiopian region and to suggest the generic limits within the group.

The work is based upon a study of almost two thousand specimens including all the existing types of the species mentioned; where the type is lost this is stated in the redescriptions of the species.

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Zoologisches Museum, Berlin; and Dr. B. Hanson of the Natural History Museum, Stockholm.

#### HISTORICAL.

The earliest described genus that can be regarded as a member of the *Aulacobothrus* complex is *Dnopherula* Karsch (1896: 259), erected to include a new species *callosa*. I. Bolivar (1902: 597) erected *Aulacobothrus* for several Indian species of which *A. strictus* was selected as the type for the genus by Kirby (1910: 189). The same author (I. Bolivar 1909), in his observations on the Truxalinae, differentiated three more genera, *Ticra*, *Phorenula* and *Berengueria* in a key without designating or describing type species. Later (I. Bolivar 1912) he described *pictipes* into *Ticra* (*Zicra*), *dorsata* into *Phorenula* and *rotundifrons* and *obliquifrons* into *Berengueria*. Uvarov (1953) designated *rotundifrons* as the type of the genus *Berengueria*. Uvarov (1953: 171) erected the genus *Luenia* to include a new species *burri*.

Uvarov (1926: 430) synonymised *Phorenula* with *Aulacobothrus*. Later the same author (Uvarov 1937: 3) synonymised the New World genus *Scyllinops* Rehn (1927) with *Aulacobothrus*. This combination brought a sharp rejoinder from Rehn (1939) rejecting the synonymy and Uvarov (1953: 166) accepted this rejection and removed *Scyllinops* from the official list of synonymy of *Aulacobothrus*.

Uvarov (1953: 177) further synonymised *Ticra* with *Dnopherula* claiming that the two type species *pictipes* and *callosa* were conspecific. The present author has re-examined both types and although agreeing that the two species are congeneric regards them as separate species.

Dirsh (1958) examining the whole complex recognised three distinct genera — *Aulacobothrus*, *Phorenula* and *Dnopherula*, synonymising *Berengueria* with *Dnopherula*. Dirsh's reasoning for separating *Aulacobothrus* from *Phorenula* was based solely upon the type species of *Aulacobothrus*, *A. strictus*. The present author agrees with this reasoning as it is probable that the remaining Indian species placed in the genus *Aulacobothrus* are not congeneric with *strictus*. However it is beyond the scope of this paper to examine this probability further as it would involve a major revision of several truxalinae genera.

Dirsh (1961: 396) further synonymised *Luenia* with *Phorenula*.

After a careful reappraisal of the group and an examination of all



type species it is, at present, decided to synonymise *Phorenula* with *Dnopherula*. The character of the depth and consistency of the fastigial foveolae used by Dirsh (1958) to separate the two genera has, after an examination of many hundreds of specimens, proved to be unstable and even to vary intra-specifically.

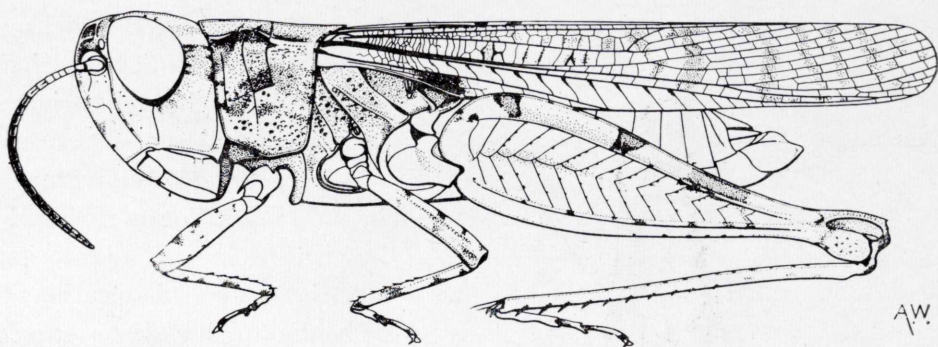


Fig. 1.—*Dnopherula pictipes* (Bolívar), entire, lateral view.

The genus *Aulacobothrus* is, at present, not known to occur in the Ethiopian Region and is therefore not treated here. Whether the genus *Dnopherula* occurs in the Oriental Region is entirely another matter and, since the Oriental Truxalines and the species at present placed in the genus *Aulacobothrus* are so poorly known, *Dnopherula* is here considered as a purely Ethiopian genus.

### ***Dnopherula* Karsch, 1896.**

*Dnopherula* Karsch, 1896: 259.

*Ticra* I. Bolívar, 1909: 294; Uvarov, 1953: 177.

*Phorenula* I. Bolívar, 1909: 296; *syn. nov.*

*Bcrengueria* I. Bolívar, 1909: 296; Dirsh, 1958: 30.

*Lucnia* Uvarov, 1953: 171; Dirsh, 1961: 396.

Small. Integument from rugose to finely punctate. Antennae filiform, although sometimes flattened at base, shorter, as long as or slightly longer than head and pronotum together. Head sub-conical; fastigium of vertex parabolic or trapezoid, slightly longer than wide, with obtuse or truncate apex; somewhat concave in middle, with transverse furrow and median and lateral carinulae, the latter often merging with

carinulae of vertex; fastigial foveolae visible from above, deep or shallow, rhomboid, oval, or of irregular shape, with sharp or indistinct margins; frons oblique, slightly excurved; frontal ridge two or three times as wide as scape, sometimes narrowing above, coarsely and densely pitted or finely and sparsely pitted, flat or weakly convex, without lateral carinulae.

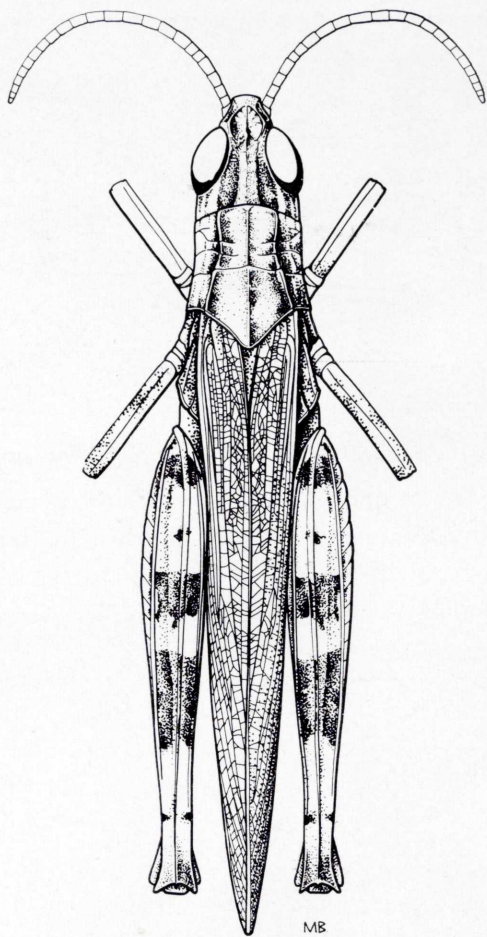


Fig. 2.—*Dnopherula dorsata* (Bolivar), entire, dorsal view.

Dorsum of pronotum flattened and slightly constricted; median carina sharp, linear; lateral carinae, in front of first sulcus, parallel or divergent, always divergent in metazona; dorsum crossed by three sulci, only posterior sulcus crosses median carina at or behind middle of pronotum; posterior margin of pronotum from rectangular to obtuse; mesosternal interspace from slightly wider than long to slightly longer than wide; metasternal lobes normally contiguous in both sexes. Tegmina and wings fully developed or shortened; membrane of tegmen semitransparent or transparent, reticulation moderately dense. Hind femur from moderately slender to slender; hind tibia as long as femur; lower, inner, apical, hind tibial spur slightly longer than upper spur and continuously upcurved or much longer than upper spur with only

tip upcurved. Arolium moderately large. Cercus narrow, acutely conical. Subgenital plate of male short, subconical with rounded apex. Epiphallus with narrow bridge, slender ancorae and bilobate lophi. Apical valve of penis always with subapico-ventral projection; cingulum with long apodemes forming horse-shoe shaped structure. Ovipositor



short, moderately slender, with curved valves. Spermatheca almost always with short apical and large sac-like preapical diverticula rarely without apical diverticulum.

Types species.—*Dnopherula callosa* Karsch, 1896: 259; type locality, Milanji, Nyassaland.

Type species of *Ticra*.—*T. pictipes* I. Bolivar, 1912: 80; type locality, Kalumba, Congo.

Type species of *Phorenula*.—*P. dorsata* I. Bolivar, 1912: 81; type locality, Mpika, N. Rhodesia (Dirsh, 1958: 29).

Type species of *Berengueria*.—*B. rotundifrons* I. Bolivar, 1912: 83; type locality, Kalumba, Congo (Dirsh, 1958: 32).

Type species of *Luenia*.—*L. burri* Uvarov, 1953: 171; type locality, Katula, Moxico District, Angola.

*Dnopherula* may be distinguished from other Truxalinae by the carinulate vertex; upper fastigial foveolae; moderately wide, flat or weakly convex frontal ridge; and the shorter pronotum with its lateral carinae parallel or divergent in front of the first transverse sulcus.

As mentioned above *Dnopherula* is here regarded as a purely Ethiopian genus. Within the genus the species are fairly evenly distributed throughout the Region. Several species are purely West African with two (*bifoveolata* and *invenusta*) extending eastwards to the Sudan; several are restricted to East, Central and South-East Africa; one species (*crassipes*) appears to be purely South African; and another species (*werneriana*) is widely distributed across the whole region extending from Senegal in the West, eastwards to the Sudan and south-eastwards to Lake Rukwa in Tanganyika.

The phylogeny of the species within the genus is difficult to follow and all the species cannot be clearly placed into groups. However, *rotundifrons* and *bifoveolata* can be separated off because of the broad and coarsely punctate frontal ridge in the two species; and *richardsi*, *backlundii* sp. n., *planifoveola* sp. n., and *dubia* sp. n. can be grouped together because of their very short metazona of pronotum and somewhat reduced tegmina. The genus can be divided arbitrarily in other ways such as thickness of hind femur, length of lower inner apical spur of the hind tibia, and the form of the lateral carinae of the pronotum, but these divisions cut across more obvious and apparently natural relationships.

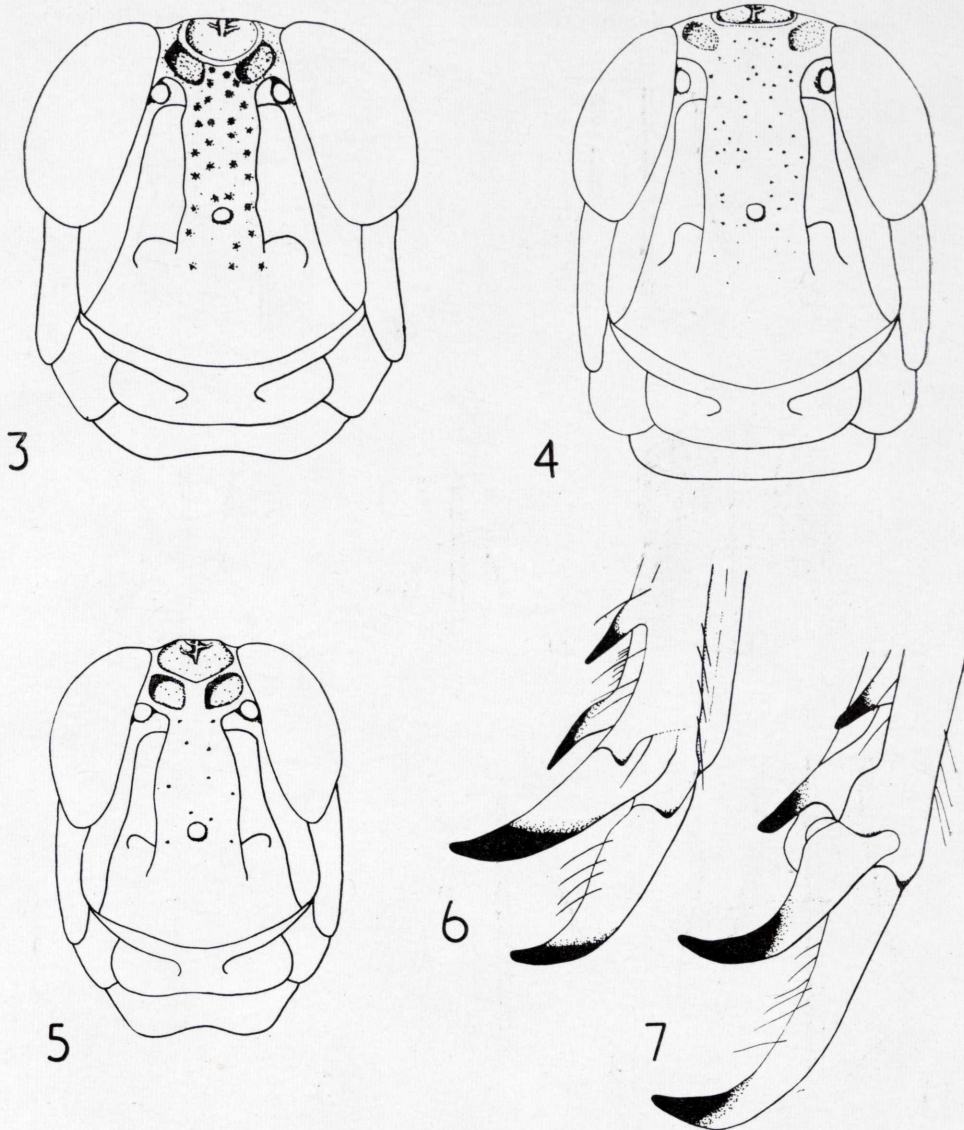
The phallic complex is fairly uniform within the genus, as is typical of most Truxalinae genera. The female spermatheca is also uniform apart from one species *invenusta* which has a remarkable spermatheca which lacks the small apical diverticulum typical of the whole subfamily.

#### KEY TO SPECIES.

1. Frontal ridge wide, of constant width, coarsely and densely punctate (fig. 3). ..... 2.
- Frontal ridge narrower, often narrowing upwards, smooth or finely and sparsely punctate (figs. 4, 5) ..... 3.
2. Inner, hind tibial apical spurs of almost equal length; lateral carinae of pronotum normally sharply defined in metazona and anterior part of prozona; fastigial foveolae normally sharply defined; inner surface of hind femur, and hind tibia ruby-red. West Africa, Sudan ..... **bifoveolata** (Karsch).
- Lower, inner, apical spur of hind tibia much longer than upper spur; lateral carinae of pronotum normally weakly defined; fastigial foveolae weakly defined; inner surface of hind femur, and hind tibia orange-red or ochraceous. Central, East and South-East Africa ..... **rotundifrons** (Bolivar).
3. Posterior transverse sulcus of pronotum placed well behind middle of pronotum, i. e. metazona much shorter than prozona (figs. 10, 12) ..... 4.
- Posterior sulcus of pronotum placed at middle of pronotum, i. e. metazona as long as prozona (figs. 9, 11, 13-15) ..... 7.
4. Lower inner apical spur of hind tibia much longer than upper spur, being straight in basal two-thirds with only tip upcurved; hind femur relatively slender. Zambia. .... **dubia** sp. nov.
- Inner apical spurs of hind tibia subequal; hind femur relatively broad ..... 5.
5. Fastigial foveolae very weak, scarcely visible; frontal ridge relatively wide and of constant width; hind femur very broad. Southern Angola ..... **planifoveola** sp. nov.
- Fastigial foveolae clearly visible, oval or rhomboid; frontal ridge narrower, narrowing upwards or of constant width; hind femur moderately broad. ... 6.
6. Fastigium trapezoid; frontal ridge of constant width; posterior margin of pronotum rectangular; widened costal area of male tegmen not extending to tip of tegmen; female tegmen extending to eighth abdominal tergite; basal valves of penis hardly recurved apically (fig. 90). Katanga, Tanganyika ... **backlundi** sp. nov.
- Fastigium parabolic; frontal ridge narrowing upwards; posterior margin of pronotum obtusiangular; widened costal area of male tegmen extending to tip of tegmen; female tegmen only extending to third abdominal tergite; basal valves of penis recurved apically (fig. 85). East and South East Africa. .... **richardsi** (Uvarov).



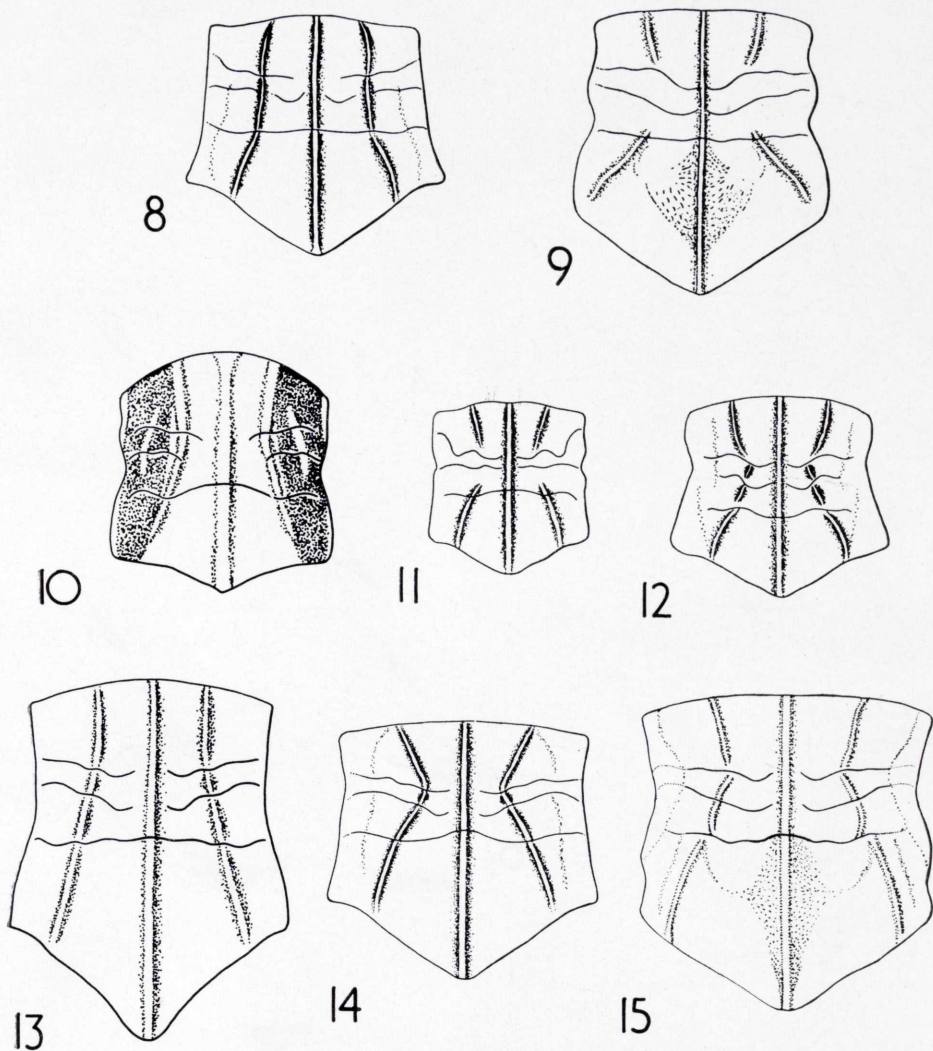
7. Lower, inner, apical spur of hind tibia much longer than upper spur, straight in basal two-thirds with only tip upcurved (fig. 7) ..... 8.



Figs. 3-7.—Anterior view of head of; 3) *Dnopherula rotundifrons* (Bolivar); 4) *D. dorsata* (Bolivar); 5) *D. werneriana* (Karny); inner apical hind tibial spurs of; 6) *D. obscura* (Chopard); 7) *D. obliquifrons* (Bolivar).

- Lower, inner, apical spur of hind tibia hardly longer than upper spur, continuously upcurved (fig. 6) ..... 13.
8. Lateral carinae of pronotum, in front of first sulcus, parallel or only very slightly divergent (fig. 13) ..... 9.

- Lateral carinae of pronotum, in front of first sulcus, strongly divergent (figs. 9, 14, 15) ..... 11.
9. Hind femur relatively broad, ratio of length to width not more than 3.8. East, Central and South Africa ..... **dorsata** (Bolivar).

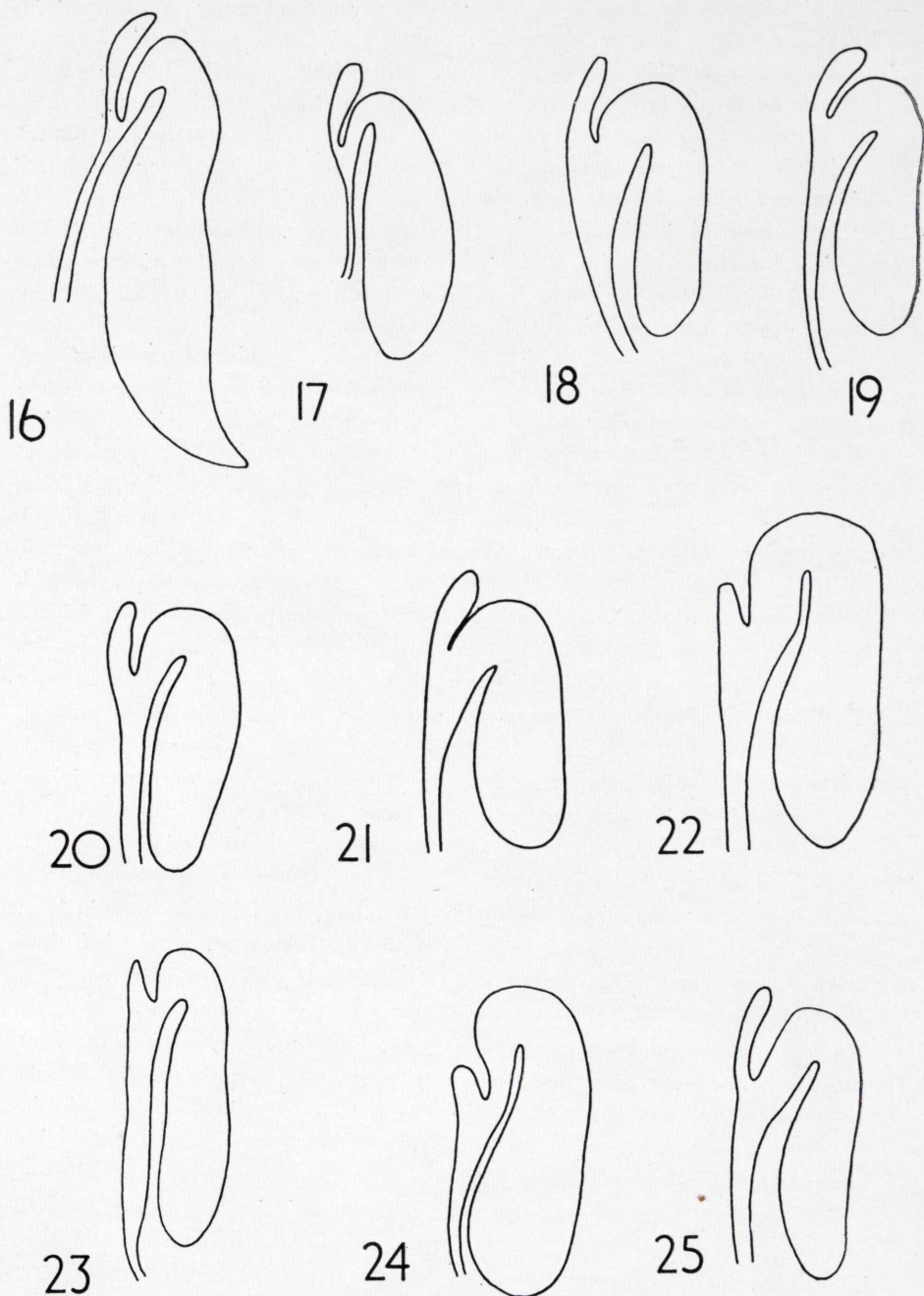


Figs. 8-15.—Dorsum of pronotum of, 8) *Aulacobothrus strictus* Bolivar; 9) *Dno-pherula rotundifrons* (Bolivar); 10) *D. planifoveola* sp. nov.; 11) *D. descampsi* sp. nov.; 12) *D. richardsi* (Uvarov); 13) *D. dorsata* (Bolivar); 14) *D. cruciata* (Bolivar); 15) *D. obliquifrons* (Bolivar).

- Hind femur very narrow, ratio of length to width not less than 4.2. ... 10.
10. Fastigial, foveole shallow, oval with weakly defined margins; mesosternal interspace not longer than wide. Kenya ..... **emalica** (Uvarov).



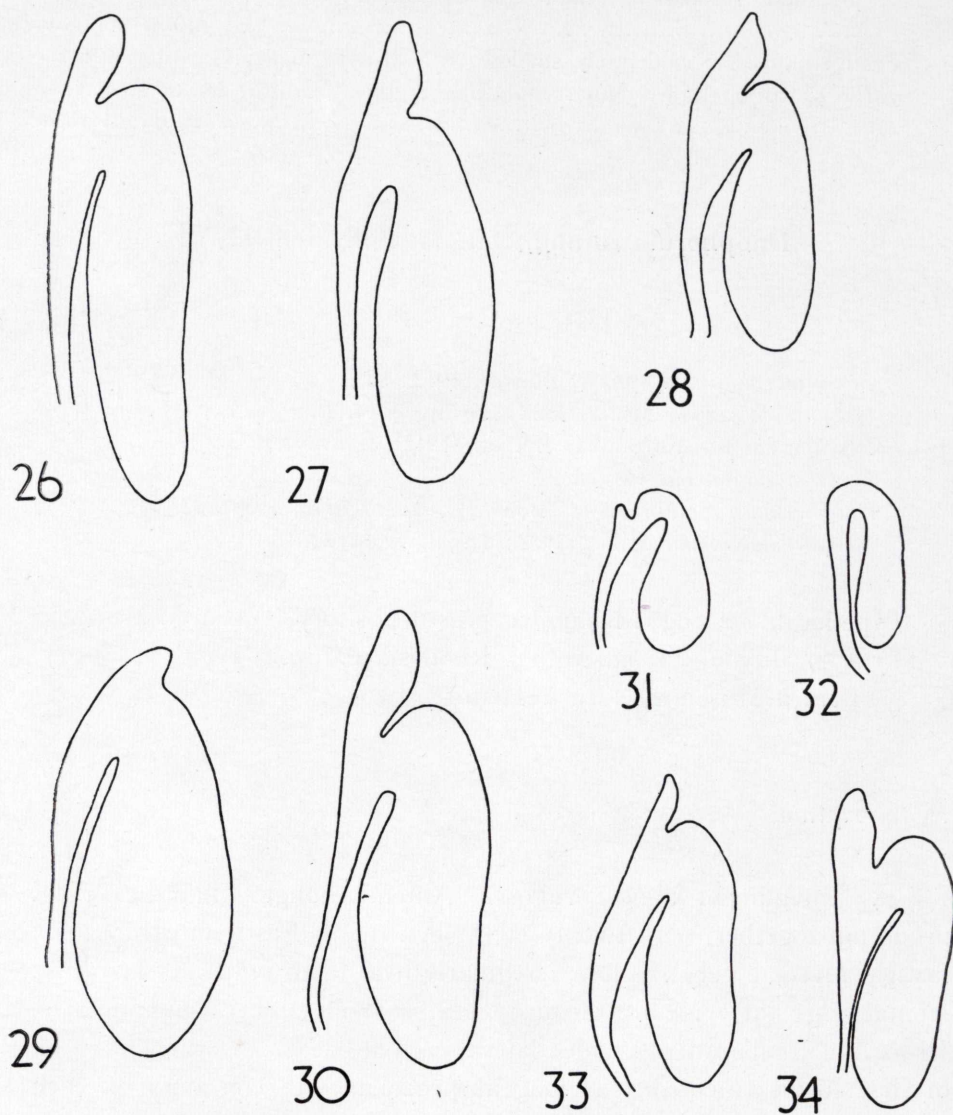
- Fastigial foveolae deeper, rhomboid with distinct margins; mesosternal interspace longer than wide ..... **burri** (Uvarov).
- 11. Hind femur very broad, ratio of length to width normally 3.2-3.6; mesosternal interspace normally wider than long. South and S. W. Africa ..... **crassipes** (Uvarov).
- Hind femur narrow, ratio of length to width not less than 3.9; mesosternal interspace normally not wider than long ..... 12.
- 12. Fastigium parabolic; frontal ridge relatively narrow; distance between median pronotal carina and point where first sulcus crosses lateral carina as great as length of lateral carina in front of first sulcus (fig. 15); basal valves of penis hardly recurved apically (fig. 94). Central and East Africa ..... **obliquifrons** (Bolivar).
- Fastigium parabolic; frontal ridge relatively narrow; distance between median pronotal carina and point where first sulcus crosses lateral carina much less than length of lateral carina in front of first sulcus (fig. 14); basal valves of penis strongly recurved apically (fig. 99). East. Central and South Africa. .... **cruciata** (Bolivar).
- 13. Hind femur relatively narrow, ratio of length to width never less than 4.0. .... 14.
- Hind femur relatively broad, ratio of length to width normally about 3.5 but never more than 3.9 ..... 16.
- 14. Lateral carinae of pronotum, in front of first transverse sulcus parallel or only very slightly divergent; dorsum of pronotum without criss-cross pattern. West Africa ..... **obscura** (Chopard).
- Lateral carinae of pronotum, in front of first transverse sulcus strongly divergent; dorsum of pronotum with prominent criss-cross pattern. West and East Africa ..... **werneriana** (Karny).
- 15. Rugose integument; lateral carinae of pronotum evanescent between first and third transverse sulci; tegmen strongly exceeding tip of hind femora in both sexes; inner surface of hind femur, and apical three-quarters of hind tibia bright orange, hind tarsus contrastingly lilac dorsally. West Africa ..... **punctata** (Uvarov).
- Much less rugose integument; lateral carinae of pronotum obvious between first and third transverse sulci; tegmen not strongly exceeding tip of hind femur, inner surface of hind femur, hind tibia and tarsus grey, ochraceous or reddish. .... 16.
- 16. Lateral carinae of pronotum, in front of first transverse sulcus parallel or only slightly divergent; spermatheca without apical sac. West Africa, Sudan ..... **invenusta** (Karsch).
- Lateral carinae of pronotum strongly divergent in front of first transverse sulcus; spermatheca with apical sac ..... 17.
- 17. Frontal ridge narrowing upwards; fastigial foveolae deep, rhomboid or oval ..... 18.
- Frontal ridge of constant width; fastigial foveolae moderately or very shallow ..... 20.



Figs. 16-25.—Spermathecae of *Dnopherula* spp. 16) *D. rotundifrons* (Bolivar); 17) *D. bifoveolata* (Karsch); 18) *D. richardsi* (Uvarov); 19) *D. phippi* (Llorente); 20) *D. gilloni* sp. nov.; 21) *D. planifoveola* sp. nov.; 22) *D. obliquifrons* (Bolivar); 23) *D. dorsata* (Bolivar); 24) *D. burri* (Uvarov); 25) *D. descampsi* sp. nov.



18. Tegmen fully developed, exceeding tip of hind femur; frontal ridge convex; fastigial foveolae rhomboid. East and Central Africa ... **pictipes** (Bolivar).



Figs. 26-34.—Spermathecae of *Dnopherula* spp. 26) *D. cruciata* (Bolivar); 27) *D. callosa* Karsch; 28) *D. punctata* (Uvarov); 29) *D. pictipes* (Bolivar); 30) *D. emalica* (Uvarov); 31) *D. crassipes* (Uvarov); 32) *D. invenusta* (Karsch); 33) *D. werneri* (Karny); 34) *D. obscura* (Chopard).

- Tegmen reduced or at most reaching tip of hind femur; frontal ridge flat; fastigial foveolae oval. West Africa ..... 19.
19. Tegmen exceeding tip of abdomen in both sexes ..... **phippii** (Llorente).

- Tegmen abbreviated, in male not surpassing ninth abdominal tergite, in female not surpassing fourth abdominal tergite ..... *descampsi* sp. nov.
- 20. Fastigial foveolae very shallow with indistinct margins; posterior margin of pronotum rectangular; hind tibia ochraceous. Ivory Coast ..... *gilloni* sp. nov.
- Fastigial foveolae moderately shallow with distinct margins; posterior margin of pronotum obtuseangular; hind tibia reddish. Central and S. E. Africa. .... *callosa* Karsch.

### ***Dnopherula rotundifrons* (I. Bolivar, 1912).**

(Figs. 3, 9, 16, 35-39.)

*Berengueria rotundifrons* I. Bolivar, 1912: 83.

*Dnopherula citrina* Miller, 1932: 26, fig. 8, A. B.; *syn nov.*

*Berengueria rotundifrons* I. Bolivar, 1912; Uvarov, 1953: 177.

*Berengueria citrina* (Miller, 1932); Uvarov, 1953: 177.

*Dnopherula rotundifrons* (I. Bolivar, 1912); Dirsh, 1958: 32.

*Dnopherula citrina* Miller, 1932; Dirsh, 1958: 32.

Type locality, Congo: Kalumba; type depository, Tervuren Museum.

Type locality of *citrina* Miller, Rhodesia: Mazoe; type depository, British Museum (Natural History).

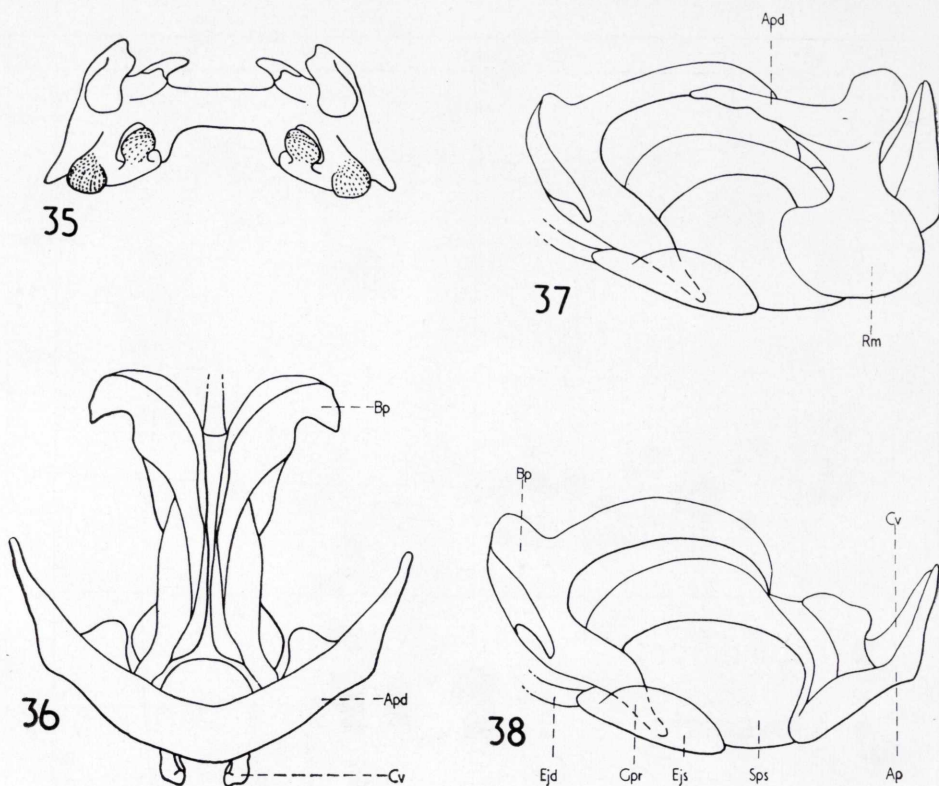
#### *Redescription.*

♂. Integument almost rugose. Antenna longer than head and pronotum together, with twenty-eight segments. Fastigium trapezoid; fastigial foveolae very shallow, irregularly oval, with indistinct margins; frontal ridge flat, wide, of constant width, coarsely and densely punctate. Pronotum comparatively wide; lateral carinae weak, divergent in front of first sulcus; metazona as long as prozona, with concavity on each side of median carina behind posterior transverse sulcus; posterior margin of pronotum rectangular; mesosternal interspace as long as wide; metasternal lobes contiguous. Tegmen semitransparent, exceeding tip of hind femur. Hind femur relatively broad. Lower inner apical spur of hind tibia longer than upper spur. Phallic complex as in figs. 35-38.

General coloration mottled brown-grey with ochraceous and darker brown markings. Vertex and dorsum of pronotum often with median



longitudinal ochraceous stripe; pleurae often with oblique ochraceous stripe; hind femur with two dark spots on upper outer area, inner side ochraceous with reddish lower area; hind tibia reddish in apical two-



Figs. 35-38.—Phallic complex of *Dnopherula rotundifrons* (Bolivar). 35) Epiphallus; 36) dorsal view, epiphallus and ectophallic membrane removed; 37) same, lateral view; 38) endophallus, lateral view.

thirds; hind wing hyaline with basal disc yellowish or sometimes almost pinkish.

♀. Larger and more robust than male.

Length of body, ♂ 17.9-19.1, ♀ 22.9-28.6; pronotum, ♂ 3.6-4.1, ♀ 4.6-5.4; tegmen, ♂ 15.3-15.9, ♀ 17.3-19.8; hind femur, ♂ 12.5-13.2, ♀ 14.3-16.1 (mm.); mean ratio of length to width of hind femur, ♂ 3.53, ♀ 3.42.

This species is quite variable in size and general coloration; rarely the lateral carinae of the pronotum are almost evanescent, and the hind wing varies from completely hyaline to yellowish to almost pinkish basally.

*D. rotundifrons* (I. Bolivar) was described from a male from Kalumba (Congo) and a female from Kambove (Congo). Dirsh (1958: 32) selected the male as Lectotype. The female paralectotype presents quite a problem as it agrees in detail with the type of *D. obliquifrons* (I. Bo-

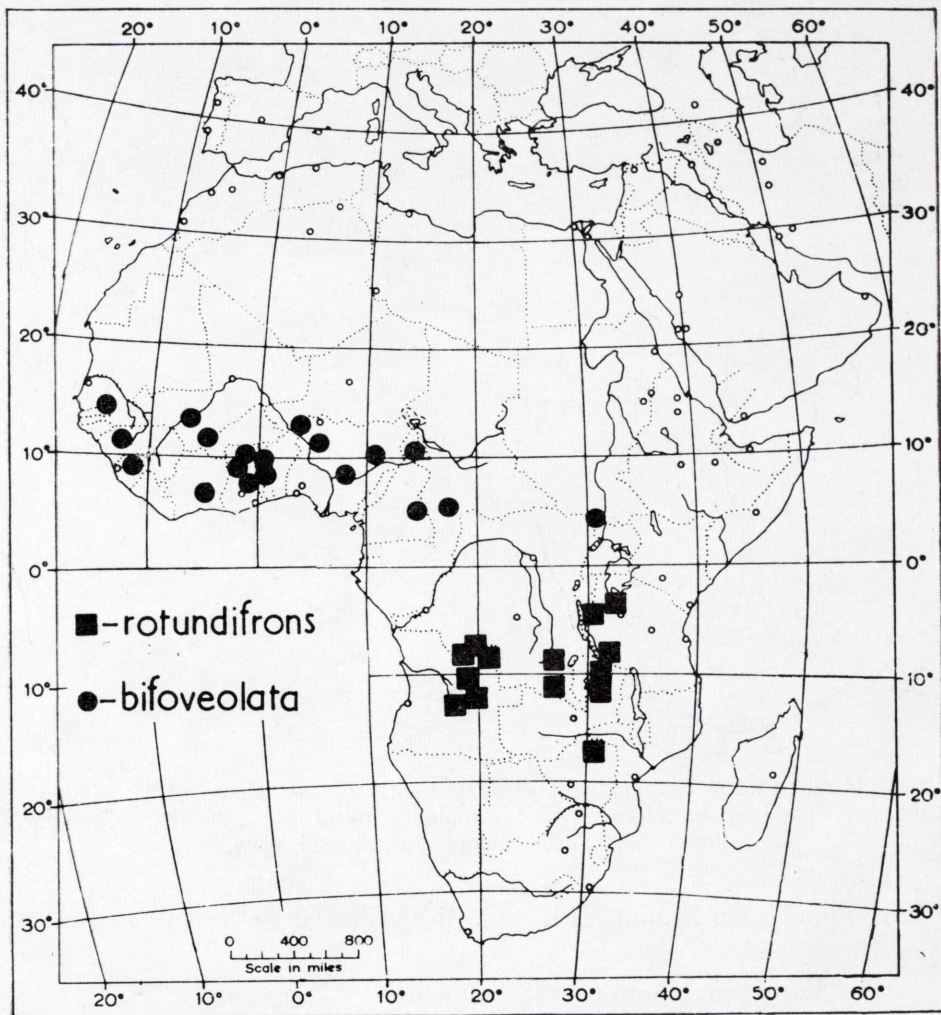


Fig. 39.—Distribution of *Dnopherula* spp.

livar) apart from the one remaining hind femur which is of the *rotundifrons* type. As this leg is glued onto the specimen the present author is assuming it has been wrongly combined with the specimen which is here identified as *D. obliquifrons* (I. Bolivar).

Number of specimens examined, 31 ♂ 38 ♀.

Distribution known to author with months of capture.



Congo (Leopoldville): Jadotville, X; Kalumba, IX;  
Tanzania: Rukwa Valley, VII, VIII; Malagarasi, VIII; Ufipa, I, VII;  
Mbizi Mt., VIII; Kahama VI, VIII, XI, XII; Kalula, VIII, IX;  
Tubugwe, X; Kigoma, XI.  
Zambia: Abercorn-Chiyanga, V-VII, IX-XII; Mpika, VI.  
Angola: Villa Luso, VI, XI; Cohemba, VIII; Alto Chicapa, VII;  
Sombo, VII; Cuilo, VII; Dundo, VII, VIII; Mabete, VII.  
Rhodesia: Mazoe, XII.

***Dnopherula bifoveolata*** (Karsch, 1933); *Comb. n.*

(Figs. 17, 39-43.)

*Pnorisa bifoveolata* Karsch, 1893: 65.

*Berengueria bifoveolata* (Karsch, 1893); Golding, 1948: 537.

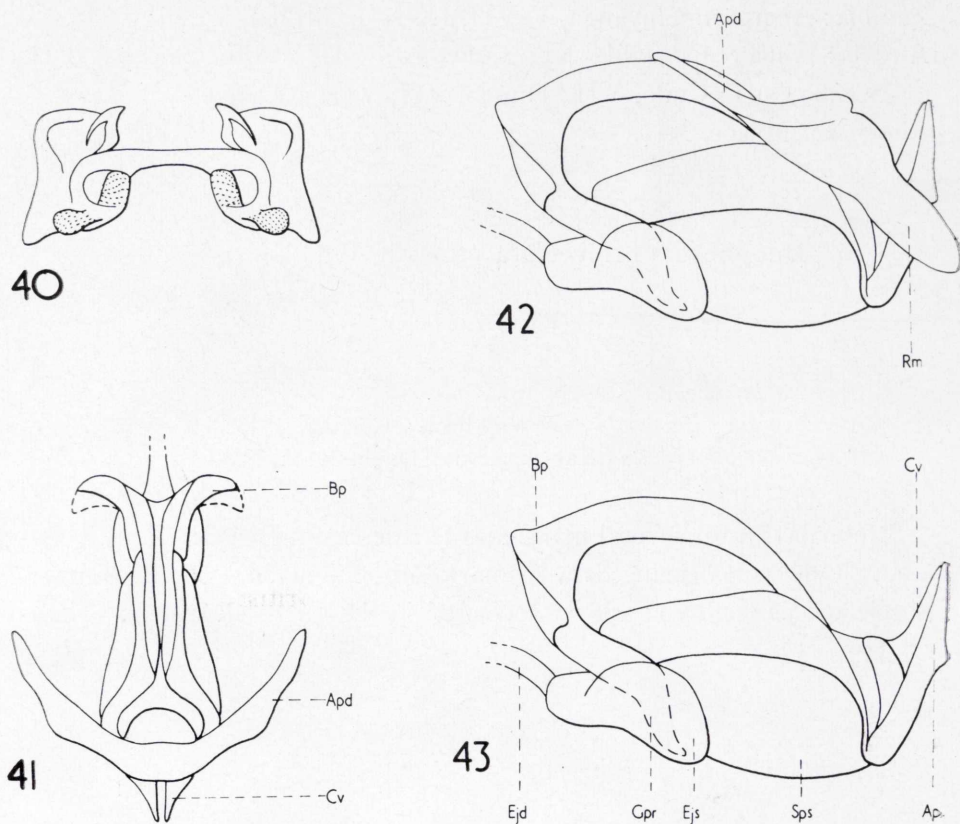
*Phorenula bifoveolata* (Karsch, 1893); Dirsh, 1958: 29.

Described from several males and females from Bismarkburg, Togoland. One male bearing data Bismarkburg, Togoland, I.91, R. Büttner, is selected as lectotype and is deposited in the British Museum (Natural History).

*Redescription.*

♂. Integument rugose. Antenna as long as or slightly longer than head and pronotum together, with twenty-seven segments. Fastigium of vertex trapezoid; fastigial foveolae oval, varying from shallow to moderately deep with poorly or moderately defined margins; frontal ridge relatively broad, convex, of constant width, coarsely and densely pitted. Dorsum of pronotum with lateral carinae well defined, rarely weak, slightly divergent in front of first transverse sulcus; metazona as long as prozona; posterior margin of pronotum rectangular; mesosternal interspace as long as wide; metasternal lobes contiguous. Tegmen semitransparent, extending beyond tip of hind femur. Hind femur relatively broad. Inner, apical spurs of hind tibia subequal. Phallic complex (figs. 40-43) with basal valves of penis varying from moderately to strongly recurved apically.

General coloration mottled grey-brown. Dorsum of pronotum occasionally with velvety brown spots behind posterior transverse sulcus on either side of the median carina; inner side of hind femur, and hind



Figs. 40-43.—Phallic complex of *Dnopherula bifoveolata* (Karsch). 40) Ephiphallus; 41) dorsal view, ephiphallus and ectophallic membrane removed; 42) same, lateral view; 43) endophallus, lateral view.

tibia strikingly ruby-red; hind wing hyaline, rarely with basal disc yellowish.

♀. Differs from male in being larger and more robust. Spermatheca (fig. 17) with finger-like apical and large, sac-like pre-apical diverticula.

Length of body, ♂ 15.7-19.7, ♀ 18.8-28.7; pronotum, ♂ 3.2-3.8, ♀ 3.7-4.5; tegmen, ♂ 13.5-17.7, ♀ 15.8-21.4; hind femur, ♂ 10.0-13.7, ♀ 12.2-15.8 (mm.); mean ratio of length to width of hind femur, ♂ 3.58, ♀ 3.59.



*D. bifoventata* (Karsch) is a fairly variable species with often quite large differences in size. The fastigial foveolae are sometimes shallow and the lateral pronotal carinae are rarely weak. Also, in the male, the basal penis valves show differences in the extent to which chitin is laid down on the lateral expansions but this probably alters with maturity.

Number of specimens examined, 51 ♂, 56 ♀.

Distribution known to author with months of capture.

Senegal: Niokolo-Koba Park, XI.

Guinea: Fulaya; Madina, VI.

Sierra Leone: Kabala, I.

Mali: Bamako; Sikasso, III; Kara, IV.

Ivory Coast: Lamto, XII-II.

Voltaic Republic: Plateau du Bena, XII.

Ghana: Yendi, IV; Masaka (Tamale Rd.), XII; Busunu-Doboye Rd., XII; Pongeri (Sawla-Wa Rd.), IV; Mamprusi, I; Kpandai, IV; Chiare, XII; Nkwanta-Ahamansu Rd., XII; Ahamansu Hills, XII; Bame, IV; Ketikrachi, IV, XII; Adibo, V; Chiranda, IV; Ejura, I; Tuna, IV; Bole, IV; Bulkwere, I; Damongo, I, IV, V; Larabanga, I, IV; Morno, V; Kpandu, IV, XII; Amedzofe, I, V.

Togoland: Bafilo, III; Bismarckburg, I; Sokodé-Basari, III.

Dahomey: Natitingou, III.

Nigeria: "S. Nigeria", XII; Mama Distr., II; Matyoro Lakes, III.

Cameroun Republic: Mokolo, XII; Bosum, I, III, IV, XI; Uam, XI.

Central African Republic: Pama-Quelle, IV, V.

Sudan: Loka Mts., I; Arua, III.

Uganda: Polebek, II.

### ***Dnopherula dorsata*** (I. Bolivar, 1912); *Comb. nov.*

(Figs. 2, 4, 13, 23, 44-47, 52.)

*Phorenula dorsata*, I. Bolivar, 1912: 81.

*Phorenula marshalli* Uvarov, 1921: 379; *syn. nov.*

*Aulacobothrus subsinuatus* Miller, 1929: 72, pl. 9 fig. 44; *syn. nov.*

*Aulacobothrus dorsatus* (I. Bolivar, 1912); Uvarov, 1953: 167.

*Aulacobothrus marshalli* (Uvarov, 1921); Uvarov, 1953: 167.

*Phorenula dorsata*, I. Bolivar, 1912: Dirsh, 1958: 29.

*Phorenula marshalli* Uvarov, 1921; Dirsh, 1958: 29.

*Phorenula subsinuata* (Miller, 1929); Dirsh, 1958: 29.

Type locality, Zambia: Mpika; type depository, Tervuren Museum: type locality of *marshalli* Uvarov, Rhodesia: Salisbury; type depository, British Museum (Natural History): type locality of *subsINUATA* Miller, Tanzania: Kalula; type depository, British Museum (Natural History).

*Redescription.*

♂. Integument rugulose. Antenna as long as head and pronotum together, with twenty-five to twenty-six segments. Fastigium of vertex trapezoid; fastigial foveolae moderately shallow, rounded rectangular with moderately defined margins; frontal ridge flat, of constant width, finely punctate. Dorsum of pronotum relatively narrow; lateral carinae parallel or very slightly divergent in front of first sulcus; metazona as long as prozona; posterior margin of pronotum rectangular; mesosternal interspace as wide as long; metasternal lobes contiguous. Tegmen semitransparent, well exceeding tip of hind femur. Hind femur relatively broad. Lower, inner, apical spur of hind tibia much longer than upper spur. Phallic complex (figs. 44-47) with basal valves of penis hardly recurved apically.

General coloration varies from light to dark brown with ochraceous and black markings. Dorsum of pronotum dark brown with median longitudinal ochraceous stripe; hind femur with three brown-black fasciae on upper outer surface, ochraceous pregenicular ring obvious; inner side of hind femur, and hind tibia reddish.

♀. As male but larger and more robust. Spermatheca (fig. 23) with short apical and long, narrow, sac-like pre-apical diverticula.

Length of body, ♂ 16.1-18.4, ♀ 20.5-26.1; pronotum, ♂ 3.1-3.7, ♀ 4.4-4.6; tegmen, ♂ 13.5-15.4, ♀ 17.3-19.3; hind femur, ♂ 10.8-12.5, ♀ 13.5-15.5 (mm.); mean ratio of length to width of hind femur, ♂ 3.58, ♀ 3.63.

*D. dorsata* (I. Bolivar) seems to be a fairly stable species varying mainly in size and general coloration, the species synonymised above can only be regarded as colour forms of one species. In having its lateral pronotae carinae parallel in front of the first transverse sulcus, broad hind femora and the lower inner apical spur of the hind tibia much longer than the upper spur *D. dorsata* (I. Bolivar) is easily distinguished from the other species of the genus.

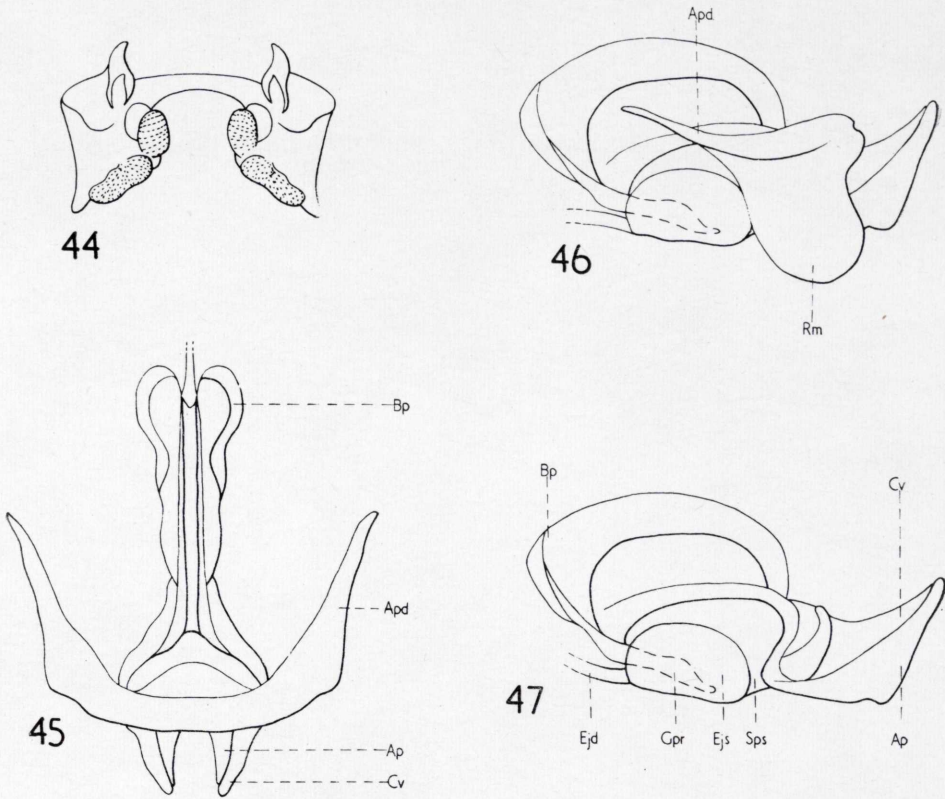
Number of specimens, examined, 33 ♂, 19 ♀.



Distribution known to author with months of capture.

Ethiopia: Lake Zwai, V; Bishoftu (30 mls. S. E. of Addis Ababa), VI.

Kenya: Thika Thika; Jombeni Hills, V.



Figs. 44-47.—Phallic complex of *Dnopherula dorsata* (Bolivar). 44) Ephiphallus; 45) dorsal view, ephiphallus and ectophallic membrane removed; 46) same, lateral view; 47) endophallus, lateral view.

Tanganyika: Katula, VIII; Mwanza, IV; Ufipa Plateau, VII; Singida, XII.

Zambia: Abercorn, VI; Mpika, I.

Angola: Camela, XII; R. Lungue Bungu, X; R. Mu-Simój, X.

Rhodesia: Musongesi Valley, IX; Mapoto Hills, IV; Salisbury, III-VIII, XI; Lomagundi, VII; Umtali, IX.

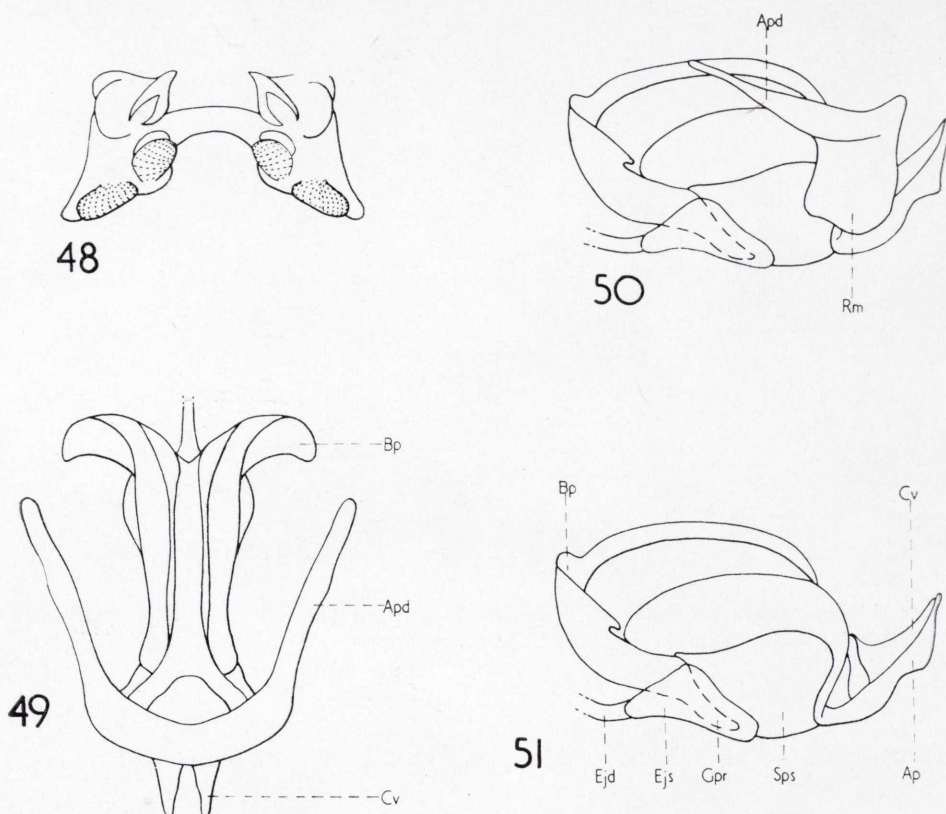
S. Africa: Haudinger (Transvaal); Pretoria, X; Johannesburg, I, II, V, X; Marico, I.

***Dnopherula emalica* (Uvarov, 1953); *Comb. nov.***

(Figs. 30, 48-52.)

*Aulacobothrus emalicus* Uvarov, 1941: 25.*Phorenula emalica* (Uvarov, 1941); Dirsh, 1958: 29.

Type locality, Kenya: Emali range, Sultan Hamud; type depository, British Museum (Natural History).



Figs. 48-51.—Phallic complex of *Dnopherula emalica* (Uvarov). 48) Epiphallus; 49) dorsal view, epiphallus and ectophallic membrane removed; 50) same, lateral view; 51) endophallus, lateral view.

***Redescription.***

♂. Integument rugulose. Antenna longer than head and pronotum together, with twenty-five segments. Fastigium broadly tra-



pezoid, almost rounded; fastigial foveolae very shallow, oval, with poorly defined margins; frontal ridge convex, broad, of constant width, finely punctate. Pronotum broad, lateral carinae parallel or scarcely divergent in front of first sulcus; metazona as long as prozona; posterior margin

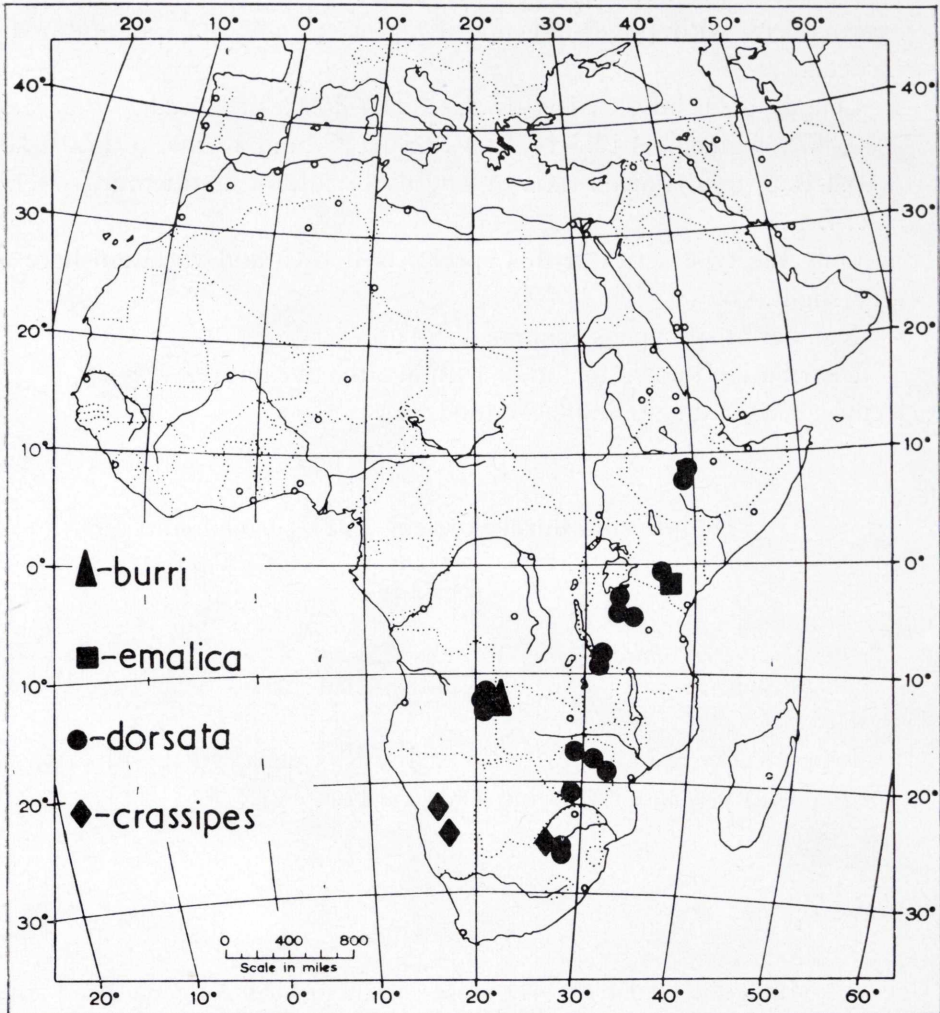


Fig. 52.—Distribution of *Dnopherula* spp.

rectangular; mesosternal interspace at most as long as broad; metasternal lobes contiguous. Tegmen transparent, almost reaching tip of hind femur. Hind femur narrow. Lower, inner, apical spur of hind tibia much longer than upper spur. Phallic complex (figs. 48-51) with basal valves of penis recurved apically.

General coloration ochraceous-brown with black stripe running from eye across lateral plate of pronotum; inner surface of hind femur, and hind tibia reddish.

♀. Differs from male in that tegmina do not quite extend to tip of abdomen; metasternal lobes often slightly but definitely separated. Spermatheca with finger-like apical and large, sac-like pre-apical diverticula.

Length of body, ♂ 16.6-17.3, ♀ 24.4-26.4; pronotum, ♂ 3.3-3.6, ♀ 4.2-4.7; tegmen, ♂ 13.3-14.2, ♀ 15.8-16.1; hind femur, ♂ 12.0-12.3, ♀ 15.4-16.0 (mm.); mean ratio of length to width of hind femur, ♂ 4.49, ♀ 4.54.

Only the type series of this species is known and variation here is very slight.

Number of specimens examined, 5 ♂, 8 ♀.

Distribution known to author with months of capture.

Kenya: Emali Range, Sultan Mamud, III.

### ***Dnopherula burri* (Uvarov, 1921); *Comb. nov.***

(Figs. 24, 52-56.)

*Luenia burri* Uvarov, 1953: 171, figs. 228-230.

*Phorenula burri* (Uvarov, 1953); Dirsh, 1961: 396.

Type locality, Angola: Moxico distr., R. Luena, village of Katula; type depository, British Museum (Natural History).

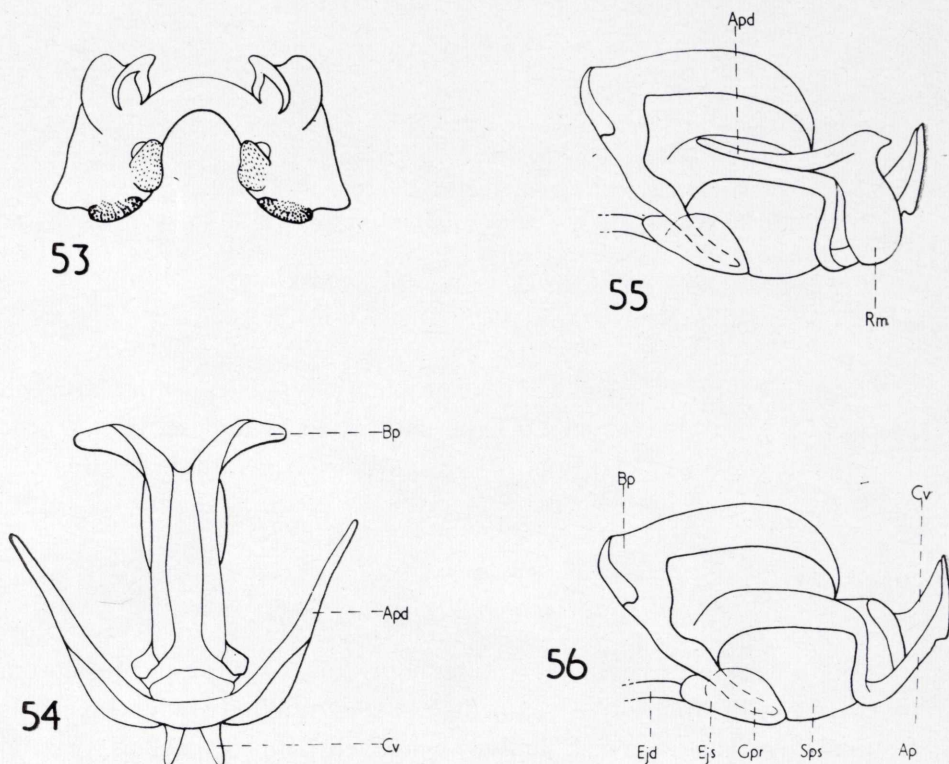
#### *Redescription.*

♂. Integument hardly rugulose. Antenna as long as head and pronotum together (after Uvarov). Fastigium parabolic; fastigial foveolae large, quadrangular, deep, with well defined margins; frontal ridge flat, of constant width apart from extreme apex which is narrower, sparsely punctate. Pronotum narrow; lateral carinae hardly divergent in front of first sulcus; metazona as long as prozona; posterior margin of pronotum obtusangular; mesosternal interspace longer than broad; metasternal lobes contiguous. Tegmen almost transparent, just exceeding tip of hind femur. Hind femur very narrow; lower, inner, apical



spur of hind tibia considerably longer than upper spur. Phallic complex (figs. 53-56) with basal valves of penis recurved apically.

General coloration mid brown with ochraceous and dark brown markings. Dorsum of pronotum with median longitudinal ochraceous stripe; costal area of tegmen ochraceous; hind tibia reddish apically.



Figs. 53-56.—Phallic complex of *Dnopherula burri* (Uvarov). 53) Ephiphallus; 54) dorsal view, ephiphallus and ectophallic membrane removed; 55) same, lateral view; 56) endophallus, lateral view.

♀. Differs from male in being slightly larger. Spermatheca with very short apical and large, sac-like pre-apical diverticula.

Length of body, ♂ 17.5-19.2, ♀ 22.7; pronotum, ♂ 3.1-3.6, ♀ 3.8; tegmen, ♂ 13.3-15.1, ♀ 16.7; hind femur, ♂ 11.0-12.7; ♀ 14.0 (after Uvarov) (mm.); mean ratio of length to width of hind femur, ♂ 5.55, ♀ (hind legs missing).

Only the type series is known, in which there is very little variation in size.

Distribution known to author with months of capture.

Angola: Chimbumba trib. of R. Lumeji VII; Luena Falls, V; Upper Chonga, V; Village of Katula, V.

***Dnopherula crassipes* (Uvarov, 1921); *Comb. n.***

(Figs. 31, 52, 57-60.)

*Aulacobothrus* (?) *crassipes* Uvarov, 1921: 371.

*Phorenula rugulosa* Uvarov, 1952: 168; *syn nov.*

*Phorenula crassipes* (Uvarov, 1921); Uvarov, 1925: 170.

*Aulacobothrus crassipes* Uvarov, 1921; Uvarov, 1953: 167.

*Aulacobothrus rugulosa* (Uvarov, 1925); Uvarov, 1953: 167.

*Phorenula crassipes* (Uvarov, 1921); Dirsh, 1958: 29.

*Phorenula rugulosa* Uvarov, 1925; Dirsh, 1958: 29.

Type locality, S. Africa: Bloemfontein; type depository, British Museum (Natural History). Type locality of *rugulosa*, S. Africa: Bloemfontein; type depository, British Museum (Natural History).

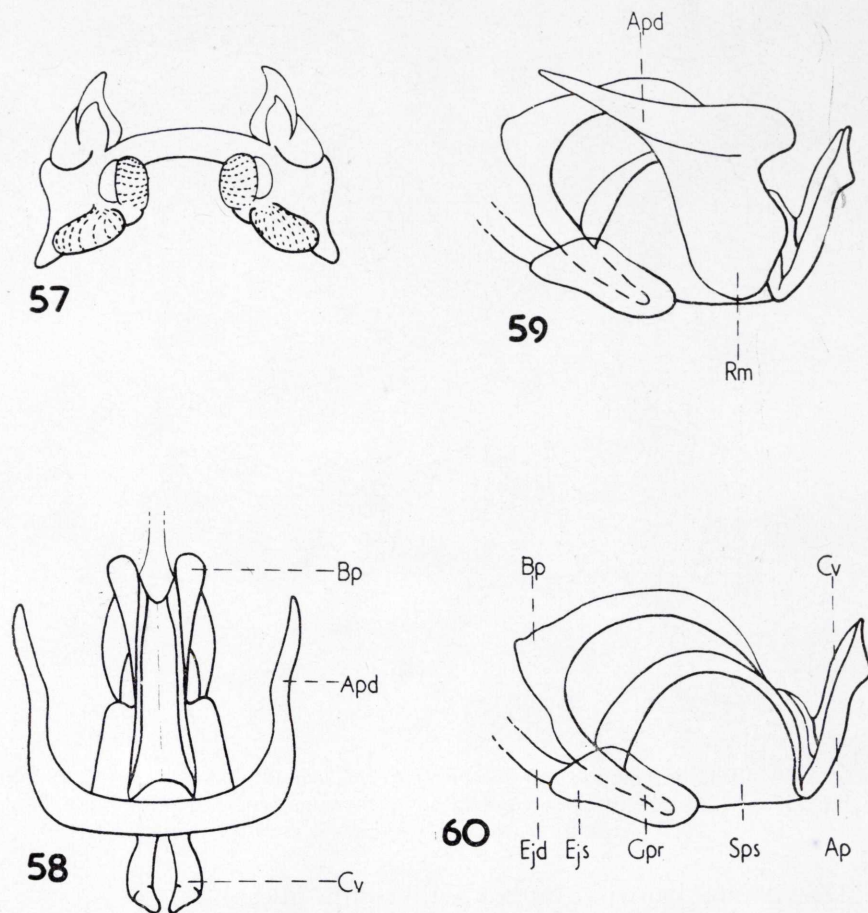
*Redescription.*

♂. Integument rugulose. Antenna as long as head and pronotum together, with twenty-five segments. Fastigium narrowly trapezoid; fastigial foveolae reniform, shallow with well defined margins; frontal ridge flat, narrowing above, sparsely and finely punctate. Pronotum narrow; lateral carinae divergent in front of first sulcus; metazona as long as prozona; posterior margin of pronotum rectangular; mesosternal interspace as long as broad; metasternal lobes contiguous. Tegmen relatively broad, semi-transparent, extending to tip of hind femur. Hind femur broad. Lower, inner, apical spur of hind tibia much longer than upper spur. Phallic complex (figs. 57-60) with basal valves of penis hardly recurved apically.

General coloration mid brown with ochraceous and dark brown markings. Vertex and dorsum of thorax with mediam longitudinal ochraceous stripe; hind femur with three dark spots on upper surface which extend to upper-outer surface; inner surface of hind femur and hind tibia reddish.



♀. Differs from male in being larger and more robust; antenna almost as long as head thorax together; fastigial foveolae less well defined; mesosternal interspace slightly broader than long; tegmen not



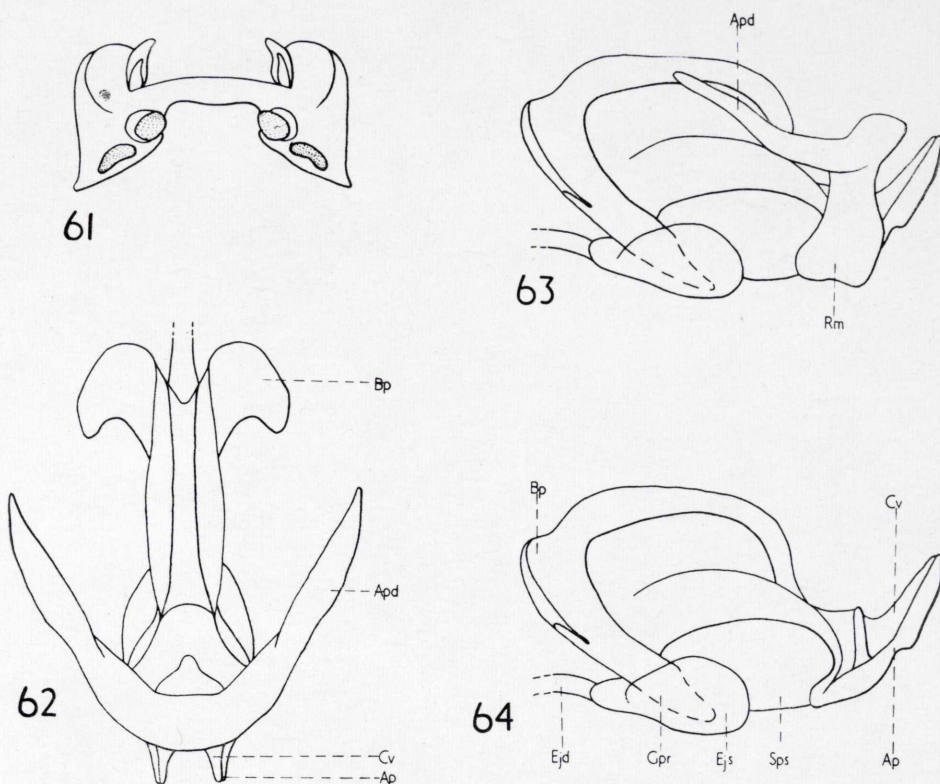
Figs. 57-60.—Phallic complex of *Dnopherula crassipes* (Uvarov). 57) Epiphallus; 58) dorsal view, epiphallus and ectophallic membrane removed; 59) same, lateral view; 60) endophallus, lateral view.

or hardly reaching tip of hind femur; spermatheca with very short apical and large, sac-like, pre-apical diverticula.

Length of body, ♂ 11.3-17.2, ♀ 16.9-20.8; pronotum, ♂ 2.4-3.7, ♀ 3.8-4.1; tegmen, ♂ 9.7-12.0, ♀ 13.4-15.4; hind femur, ♂ 7.5-9.7, ♀ 10.8-12.5 (mm.); mean ratio of length to width of hind femur, ♂ 3.36, ♀ 3.61.

Our present knowledge of this species indicates slight variation in size and the relative length of the female tegmen.

Number of specimens examined 10 ♂, 8 ♀.



Figs. 61-64.—Phallic complex of *Dnopherula obscura* (Chopard). 61) Epiphallus; 62) dorsal view, epiphallus and ectophallic membrane removed; 63) same, lateral view; 64) endophallus, lateral view.

Distribution known to author with months of capture.

S. Africa: Bloemfontein; Rustenbur, I; Pretoria, X.

S. W. Africa: Marienthal to Keetmanshoop, IV; Okahandja, I-II.

***Dnopherula obscura* (Chopard, 1947); *Comb. n.***

(Figs. 6, 34, 61-65.)

*Stenohippus obscurus* Chopard, 1947: 153.

*Phorenula obscura* (Chopard, 1947); Dirsh, 1963: 219.

Type locality, Guinea: Nimba; type depository, Paris Museum.



*Redescription.*

♂. Integument finely punctured. Antennae longer than head and pronotum together, with twenty-eight segments. Fastigium narrow trapezoid; fastigial foveolae rhomboid, deep, with well defined margins; frontal ridge flat, narrowing above, finely punctate. Pronotum narrow; lateral carinae parallel or slightly divergent in front of first sulcus; metazona as long as prozona; posterior margin of pronotum rectangular; mesosternal interspace as long as wide; metasternal lobes contiguous. Tegmen relatively narrow, semi-transparent, well exceeding tip of hind femur. Hind femur narrow. Inner apical spurs of hind tibia subequal. Phallic complex (figs. 61-64) with basal valves of penis recurved apically.

General coloration brown with ochraceous and dark brown markings. Lateral carinae of pronotum ochraceous; tegmen often with row of black dots in medial region; hind femur often with two incomplete, dark, oblique fascia on outer surface, inner surface of hind femur reddish; hind tibia ochraceous basally and reddish apically.

♀. Differs from male in being larger and slightly more robust; tegmen hardly surpasses tip hind femur. Spermatheca with short apical and large, sac-like, preapical diverticula.

Length of body, ♂ 16.1-17.8, ♀ 19.6-23.4; pronotum, ♂ 3.0-3.4, ♀ 3.7-4.1; tegmen, ♂ 12.9-14.6, ♀ 15.3-17.3; hind femur, ♂ 10.2-11.4, ♀ 11.9-13.9 (mm.); mean ratio of length to width of hind femur, ♂ 4.10, ♀ 4.11.

Few specimens of this species have been examined but from these it seems that there is little variation except in size and general coloration.

Number of specimens examined, 36 ♂, 27 ♀.

Distribution known to author with months of capture.

Liberia (Nimba); Sevane Ziéla, XII; Ziéla, IV; Plateau de Zougouépo, XII-III; Savane Bakeré, XI.

Ivory Coast: Serengbara, Gouela, Lamto, I.

Ghana: Kalbruipe, IV; Legon, II; Ifaks, I; Akuse, III, XII; Ofankor, II, IV, V, IX; Shai Hills, VI; Oyibi (Tema-Adome Rd.) IV; Dagomba, I; Keti-Krachi, XII; Ho-Hohoe Rd. (10 mls. from Volta Bridge), III; Dutukpene, XII; Kpandu, XII; Amedzofe, I-III.

Togoland: Blitta (between Tiefouma and Kabalo), III; Wurupon, XII.

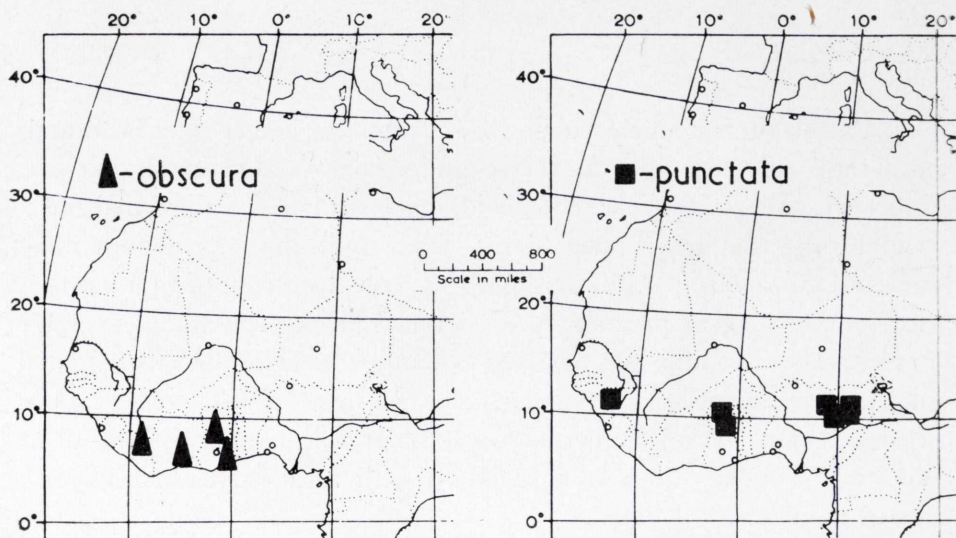


Fig. 65.—Distribution of *Dnopherula* spp.

***Dnopherula punctata* (Chopard, 1947); *Comb. nov.***

(Figs. 28, 65-69.)

*Aulacobothrus punctatus* Uvarov, 1926: 432, pl. 47, figs. 11, 12.

*Phorenula punctata* (Uvarov, 1926); Dirsh, 1958: 29.

Type locality, N. Nigeria: Azare; type depository, British Museum (Natural History).

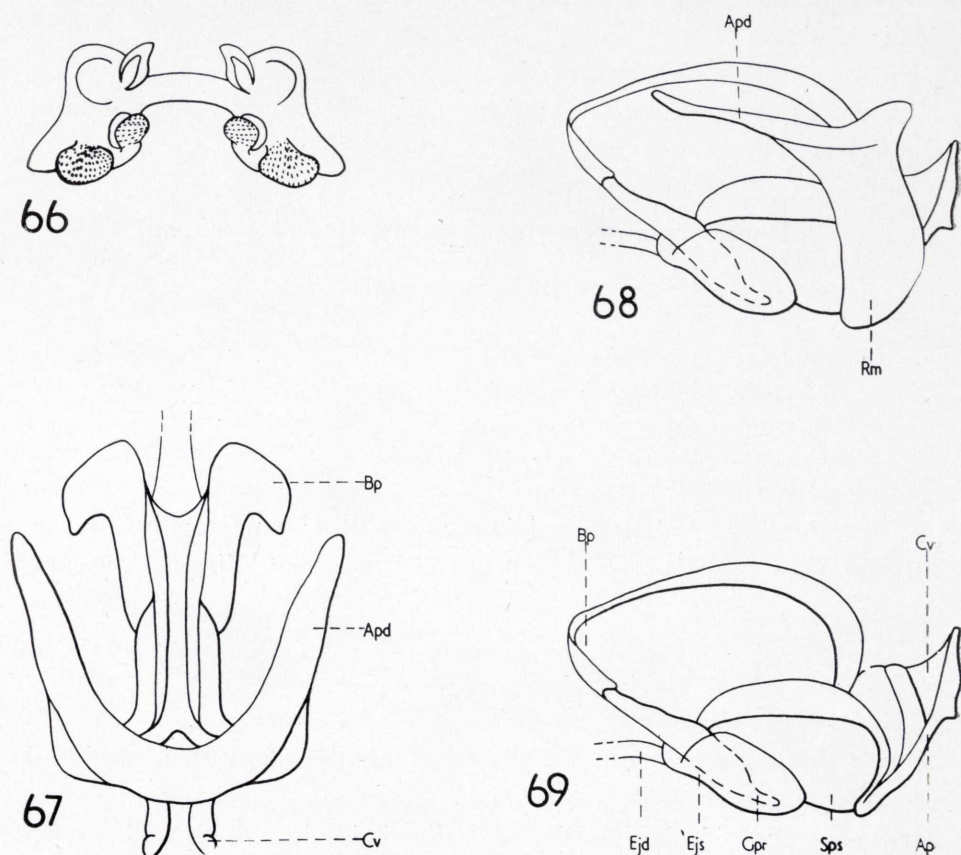
*Redescription.*

♂. Integument sub-rugose. Antennae as long as head and pronotum together, with twenty-seven segments. Fastigium trapezoid; fastigial foveolae fairly deep, rhomboid, with well defined margins; frontal ridge flat, slightly narrowing above, sparsely pitted. Pronotum narrow; lateral carinae moderately well defined but evanescent between first and third transverse sulci, divergent in front of first sulcus; metazona as long as prozona; posterior margin of pronotum acutangular; mesosternal interspace as long as broad; metasternal lobes contiguous. Tegmen moderately narrow, extending beyond tip of hind femur. Hind femur moderately broad. Inner, apical spurs of hind tibia subequal.



Phallic complex (figs. 66-69) with basal valves of penis strongly recurved at apices.

General coloration grey with lighter and darker marking. Dorsum sometimes blackish. Hind knees black; inner surface of hind femur



Figs. 66-69.—Phallic complex of *Dnopherula punctata* (Uvarov). 66) Epiphallus; 67) dorsal view, ephiphallus and ectophallic membrane removed; 68) same, lateral view; 69) endophallus, lateral view.

orange with ochraceous pre-genicular band; hind tibia orange with ochraceous basal ring; hind tarsi contrastingly lilac above.

♀. Differs from male in being larger and slightly more robust, Spermatheca as in fig. 28.

Length of body, ♂ 16.5-19.4, ♀ 20.1-22.2; pronotum, ♂ 3.1-3.3, ♀ 3.8-4.2; tegmen, ♂ 15.4-16.7, ♀ 17.5-18.0; hind femur, ♂ 10.1-11.6, ♀ 12.2-13.1; mean ratio of length to width of hind femur, ♂ 3.62, ♀ 3.51.

This species appears remarkably stable over its range and varies only in size and general coloration. The contrasting coloration of the hind tibia and tarsus however appears to be very constant.

Number of specimens examined, 22 ♂, 13 ♀.

Distribution known to author with months of capture.

Mali: Madina, VI.

Ghana: Damongo, IV; Nakon, V.

Nigeria: Matyoro Lakes, III; Azare, V, VI; S. E. Kano; Udubo, XII-II.

***Dnopherula werneriana* (Karny, 1907); *Comb. nov.***

(Figs. 5, 33, 70-74.)

*Stauroderus wernerianus* Karny, 1907: 98.

*Stauroderus wernerianus* var. *ustulata* Karny, 1907: Uvarov, 1926: 432.

*Aulacobothrus wernerianus* (Karny, 1907); Uvarov, 1926: 431.

*Phorenula werneriana* (Karny, 1907); Dirsh, 1958: 29.

Type locality, Sudan: Gondokoro; type lost: type locality of var. *ustulata* Karny, Sudan: Kordofan; type depository, Vienna Museum.

*Redescription.*

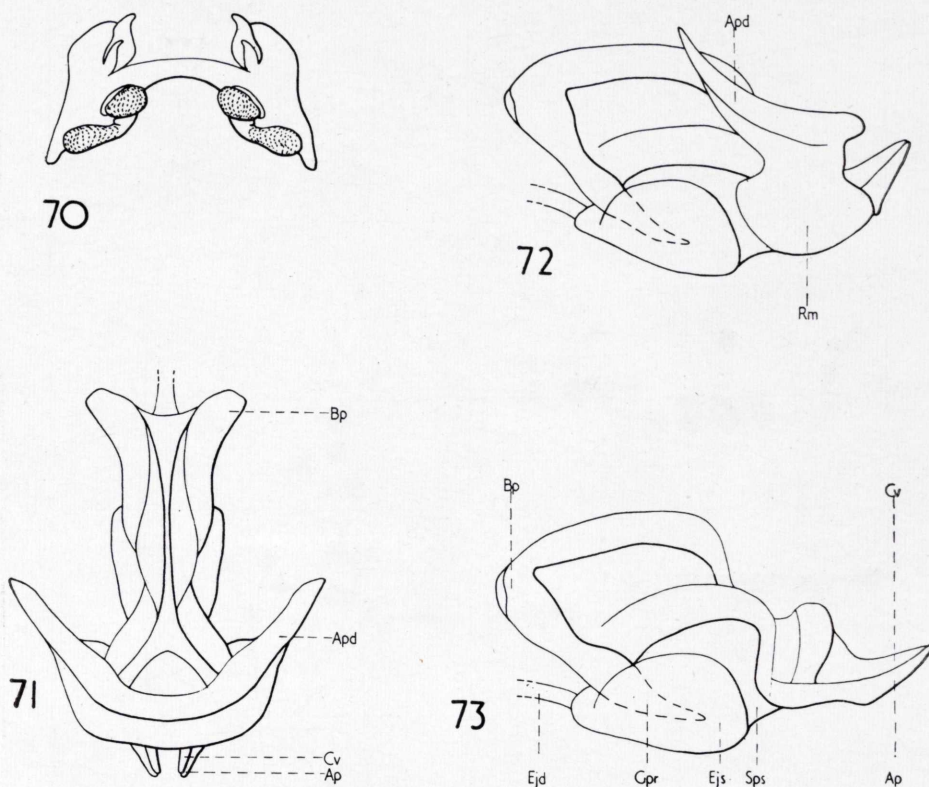
♂. Integument rugulose. Antenna slightly longer than head and pronotum together, with twenty-eight segments. Fastigium of vertex narrowly trapezoid; fastigial foveolae rhomboid, deep, with well defined margins; frontal ridge flat, strongly narrowing upwards, sparsely punctate. Dorsum of pronotum with lateral carinae strongly divergent in front of first sulcus; metazona as long as prozona; posterior margin of pronotum rectangular; mesosternal interspace as wide as long; metasternal lobes contiguous. Tegmen semitransparent, well exceeding tip of hind femur. Hind femur relatively narrow. Inner, apical hind tibial spurs subequal. Phallic complex (figs. 70-73) with basal valves of penis hardly recurved apically.

General coloration from mid brown to black through mottled grey-brown, with ochraceous and black markings. Vertex and dorsum of pronotum often with median longitudinal ochraceous stripe; dorsum of pronotum with ochraceous criss-cross pattern; outer side of hind



femur with two, complete or incomplete, oblique, dark fasciae; lower inner area of hind femur, and hind tibia reddish.

♀. As male but larger. Tegmen exceed tip of hind femur to lesser extent. Spermatheca (fig. 33) with finger-like apical and large, sac-like pre-apical diverticula.



Figs 70-73.—Phallic complex of *Dnopherula werneriana* (Karny). 70) Epiphallus; 71) dorsal view, ectophallic membrane and epiphallus removed; 72) same, lateral view; 73) endophallus, lateral view.

Length of body, ♂ 16.0-19.4, ♀ 19.5-23.6; pronotum, ♂ 3.2-3.6, ♀ 3.5-4.2; tegmen, ♂ 14.4-17.2, ♀ 15.3-19.4; hind femur, ♂ 11.4-12.7, ♀ 12.7-14.4 (mm.); mean ratio of length to width of hind femur, ♂ 4.05, ♀ 4.09.

*D. werneriana* (Karny) appears remarkably stable considering its wide distribution across Africa. Variation seems to be mainly in size and general coloration and, to a small extent, the relative length of the tegmen to overall body length.

Number of specimens examined, 157 ♂, 172 ♀.

Distribution known to author with months of capture.

Senegal: Niokolo-Koba Park, XI; Bambey, III; Mt. Rolland, VIII.

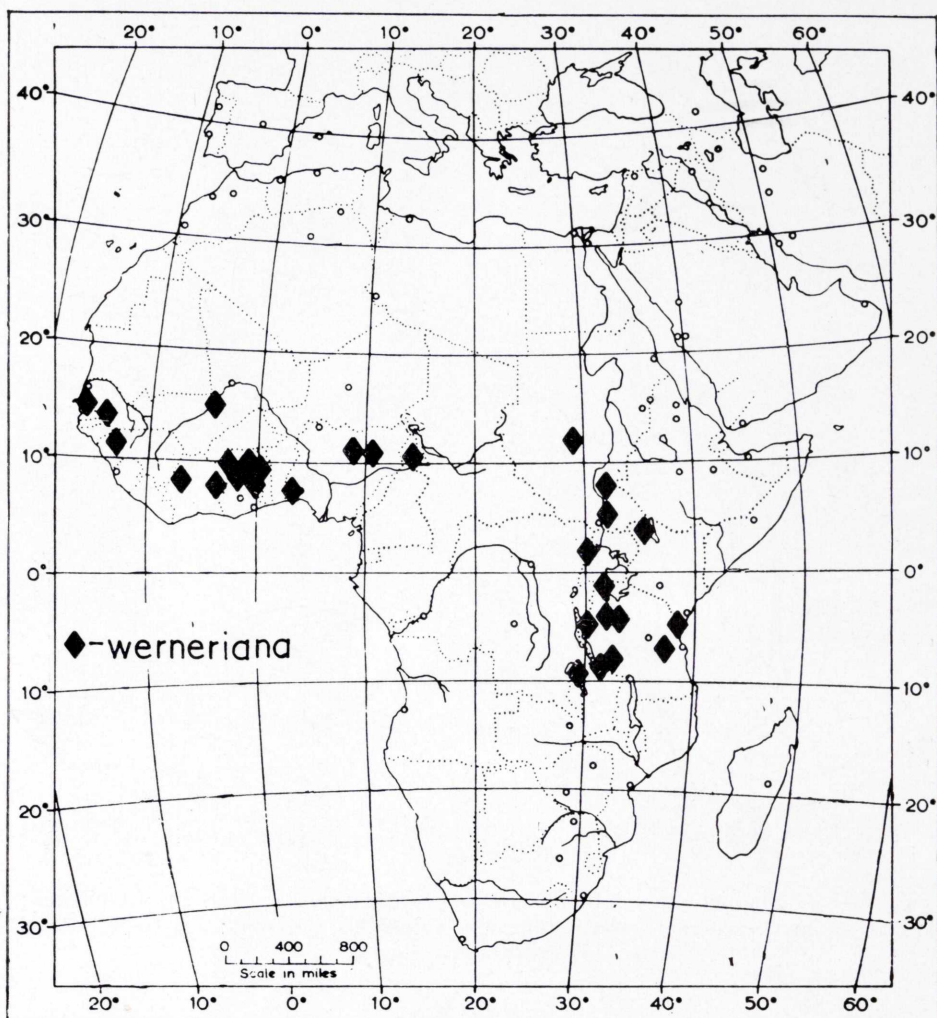


Fig. 74.—Distribution of *Dnopherula werneriana* (Karny).

Mali: Madina, VI, VII; Macina, I, II; Farimake, X; Koyal, XII.

Ivory Coast: Séguéla, XII; Bouna Reserve, I.

Ghana: Kpandai, IV; Masaka, XII; Chana-Chuchiliga Rd., IV; Han-Tamu, IV; Gulumpe (Nyawrupe-Kintampo Rd.), IV; Nagobo, I; Gambaga, I; Tuma, IV; Nakon, V; Pong Tamale, V; Larabanga,



- I; Nagbog, I; Bukwere, I; Kalbrupe, IV; Kananto, I; Nasia, I; Jema, I; Kpandu, V; Adibo, V; Keti-Krachi, V.
- Dahomey: Natitingou, III.
- Nigeria: Azare, V, VI; Gadau, III; Oyo nr. Alagbon, XII; S. E. Kano, VII.
- Cameroun Republic: Mokolo, XII.
- Sudan: Sobat River, II; Gondokoro; Kordofan.
- Uganda: Adachal, XII-I; Kampala, VII; Attiak, XI; Kavameja, XI.
- Kenya: Lokitang (Turkana).
- Tanzania: Milepa Plain, V, VI, XI; Rukwa valley, VII; Kinpangati (Rukwa), X; Chikumbi (Rukwa), X; LUNDI Mbuga (C. Rukwa), X, XI; Kapalala (C. Rukwa), VIII; Kafukola, IX-XI; Ufipa Escarpment, IX; Chingoma, X; Ikola Mbuga, VIII; Ufipa, VIII, XI; Usambara Mts., III; Old Shinyanga, VI, VII, IX, XI, XII; Bukoba, VII; Nzega, VIII; Morogoro, XI; Kigoma, XI; Tabora, VIII; Mkwemi (Kahama), VIII, IX.
- Congo: Kasenye, Lake Albert, V, VIII.
- Zambia: Mweru Wa Ntipa, VII; Abercorn, VII.

***Dnopherula phippi*** (Lorente, 1963); *Comb. nov.*

(Figs. 19, 75-79.)

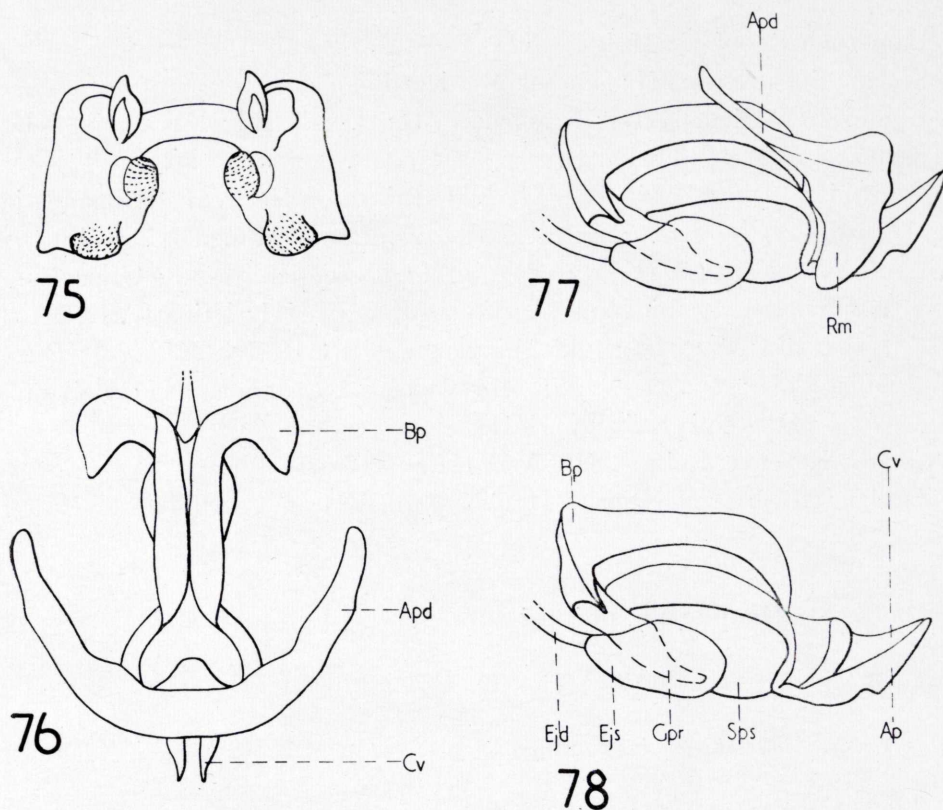
*Phorenula phippi* Lorente, 1963: 51, figs. 1-3.

Type locality, Kabala, Sierra Leone; type depository, British Museum (Natural History).

*Redescription.*

♂. Integument rugulose. Antenna longer than head and pronotum together; flagellum with twenty-three segments. Fastigium of vertex narrowly trapezoid; fastigial foveolae moderately deep, rounded rhomboid with sharply defined margins; frontal ridge flat, strongly narrowing above, finely punctate. Pronotum with lateral carinae divergent in front of first transverse sulcus; metazona as long as prozona; posterior margin of metazona moderately obtusangular; mesosternal interspace slightly wider than long; metasternal lobes contiguous. Tegmen

hardly extending beyond tip of hind femur, semitransparent. Hind femur moderately narrow. Inner apical spurs of hind tibia subequal. Phallic complex (figs. 75-78) with basal valves of penis strongly recurved apically.



Figs. 75-78.—Phallic complex of *Dnopherula phippsi* (Llorente) 75) Epiphallus; 76) dorsal view, epiphallus and ectophallic membrane removed; 77) same, lateral view; 78 endophallus, lateral view.

General coloration dark brown with ochraceous and black markings. Dorsum of pronotum normally with ochraceous criss-cross pattern; tegmen with row of black spots in medial area; hind femur with two incomplete, oblique, dark fasciae on outer side which are rarely inconspicuous, inner side reddish-brown; hind tibia reddish.

♀. Differs from male in being slightly larger; tegmen not or just reaching to tip of hind femur. Spermatheca (fig. 19) with short apical and large, sac-like pre-apical diverticula.

Length of body, ♂ 13.2-14.6, ♀ 15.5-18.4; pronotum, ♂ 2.4-2.8, ♀ 3.2-3.6; tegmen, ♂ 9.0-11.3, ♀ 11.3-13.1; hind femur, ♂ 8.3-9.3, ♀



9.9-11.1 (mm.); mean ratio of length to width of hind femur, ♂ 3.79, ♀ 3.71.

Variation in this species seems to be in size and relative length of tegmen to body length. In the type series, all from the same locality,

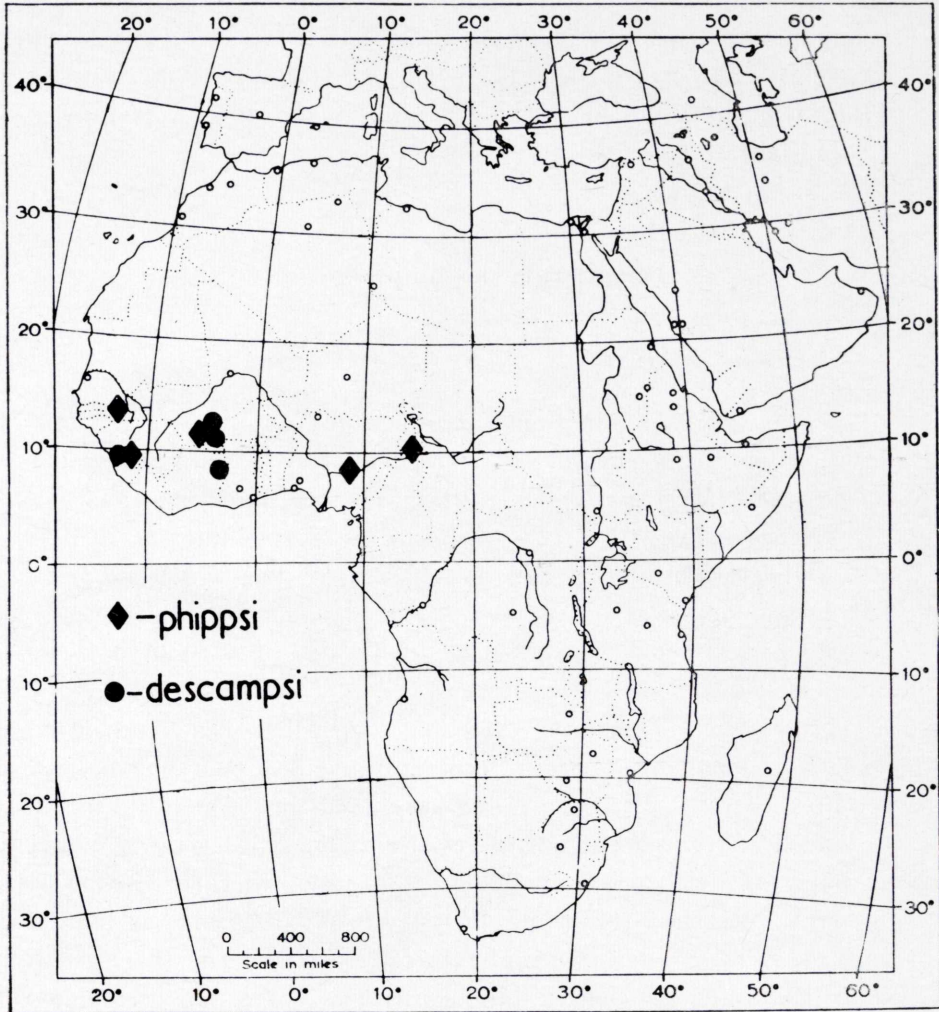


Fig. 79.—Distribution of *Dnopherula* spp.

the male tegmen extends just to tip of hind femur and not quite to the tip in females. In other specimens examined the tegmen sometimes extends slightly beyond the tip of the hind femur in males and to the tip in females.

Number of specimens examined, 31 ♂, 37 ♀.

Distribution known to author with months of capture.

Senegal: Niokolo-Koba Park, XI.

Mali: Sikasso.

Sierra Leone: Kabala, I.

Ivory Coast: Bouna Reserve, I.

Ghana: Busundu-Dobove Rd. (4 mls. N. of Mole River), XII; Damongo game reserve, V; Tamale Rd., XII; Masaka, XII; Kalbruipe, I; Bole, IV; Damongo, I; Tuna, IV; Nyigbenya, II; Ifaks, I; Han, IV; Keti-Krachi, XII; Kpandu, XII; Jema, I; Ejura, I; Oyibi (Tema-Adome Rd.), IV.

***Dnopherula descampsi* sp. nov.**

(Figs. 11, 25, 79-83.)

Holotype, ♂, Sierra Leone: Kukuna, open grass, x.1963 (J. Phipps).

Paratypes, Guinea: Fulaya, 1 ♂ (A. Balachowsky); Mali: Plateau du Bena, 1,00-1,100 m., 19/21.xii.1951, 1 ♀; Koutiala, vii.1958, 1 ♂ 5 ♀ (R. Demange), (1 ♂, 2 ♀, Paris Museum); Kouniana, ix.1959, 2 ♀ (M. Descamps), (1 ♀, Paris Museum); Sikasso, 4.xi.1963, 2 ♀ (M. Descamps), (Paris Museum).

Holotype and remaining paratypes deposited in British Museum (Natural History).

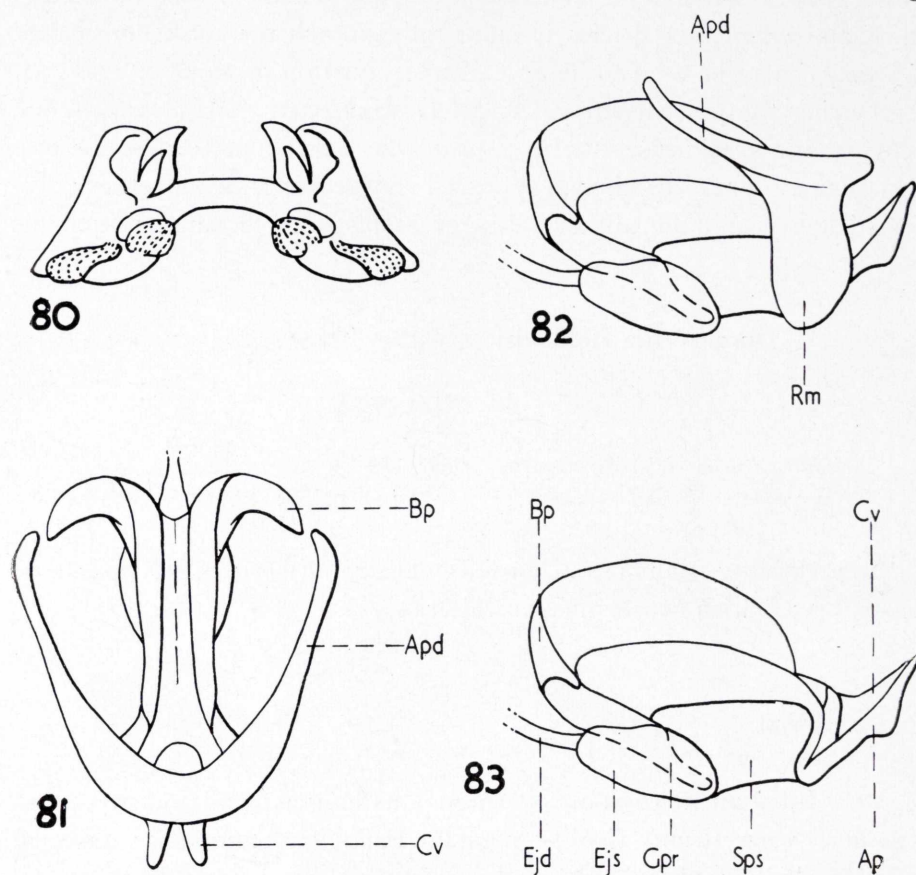
♂. Integument rugulose. Antenna longer than head and pronotum together, with twenty-four to twenty-five segments. Fastigium narrowly trapezoid; fastigial foveolae rhomboid, moderately deep with well defined margins; frontal ridge flat, narrowing strongly above, finely punctured. Pronotum moderately narrow, lateral carinae relatively weak, divergent in front of first sulcus; metazona as long as prozona; posterior margin obtusangular; mesosternal interspace slightly wider than long; metasternal lobes contiguous. Tegmen abbreviated, extending only as far as pre-genital tergite; hind wings approximately half as long as tegmen. Hind femur moderately slender. Inner hind tibial spurs subequal. Phallic complex (figs. 80-83) somewhat recurved apically.

General coloration mid-brown with lighter and darker brown and ochraceous markings. Vertex and dorsum of pronotum often with median longitudinal ochraceous stripe; dorsum of pronotum if without this stripe then with faint ochraceous criss-cross pattern; external side



of hind femur ochraceous or with two incomplete, oblique, black fascia; hind tibia reddish.

♀. Differs from male in being larger and more robust; antenna only as long as head and thorax together; tegmen strongly abbreviated, only extending to hind margin of third abdominal tergite; hind wing



Figs. 80-83.—Phallic complex of *Dnopherula descampsi* sp. nov. 80) Epiphallus; 81) dorsal view, epiphallus and ectophallic membrane removed; 82) same, lateral view; 83) endophallus, lateral view.

three-quarters length of tegmen. Spermatheca (fig. 25) with short apical and large, sac-like pre-apical diverticula.

Length of body, ♂ 10.5-12.2, ♀ 16.1-17.5; pronotum, ♂ 2.4-2.8, ♀ 3.2-3.9; tegmen, ♂ 5.4-7.0, ♀ 5.5-7.0; hind femur, ♂ 6.7-7.9, ♀ 9.4-10.0 (mm.); mean ratio of length to width of hind femur, ♂ 3.71, ♀ 3.60.

Although sub-brachypterous in the male and brachypterous in the female *D. descampsi* sp. nov. is probably more closely related to *D. phip-*

*psi* (Llorente) than to the other brachypterous species of the genus by virtue of the equal metazona and prozona. Our present knowledge would indicate that *descampsi* is a distinct species from *phippsi* being distinguished by the shortened tegmina and less recurved basal penis valves. However there is a tendency in *phippsi* to a shortening of the tegmina and when this species is more fully known the form here called *descampsi* may be seen to be an extreme variation of *phippsi*.

During the present study Dr. M. Descamps, of the Paris Museum, sent me his specimens of a new species he was about to describe into this genus. These specimens appeared conspecific with the species described above and the author takes great pleasure in naming it in his honour.

***Dnopherula richardsi* (Uvarov, 1953); *Comb. nov.***

(Figs. 12, 18, 84-88.)

*Aulacobothrus richardsi* Uvarov, 1953: 170.

*Phorenula richardsi* (Uvarov, 1953); Dirsh, 1958: 29.

Type locality, Zambia: Mporokoso Distr., Mweru Wa Ntipa; type depository, British Museum (Natural History).

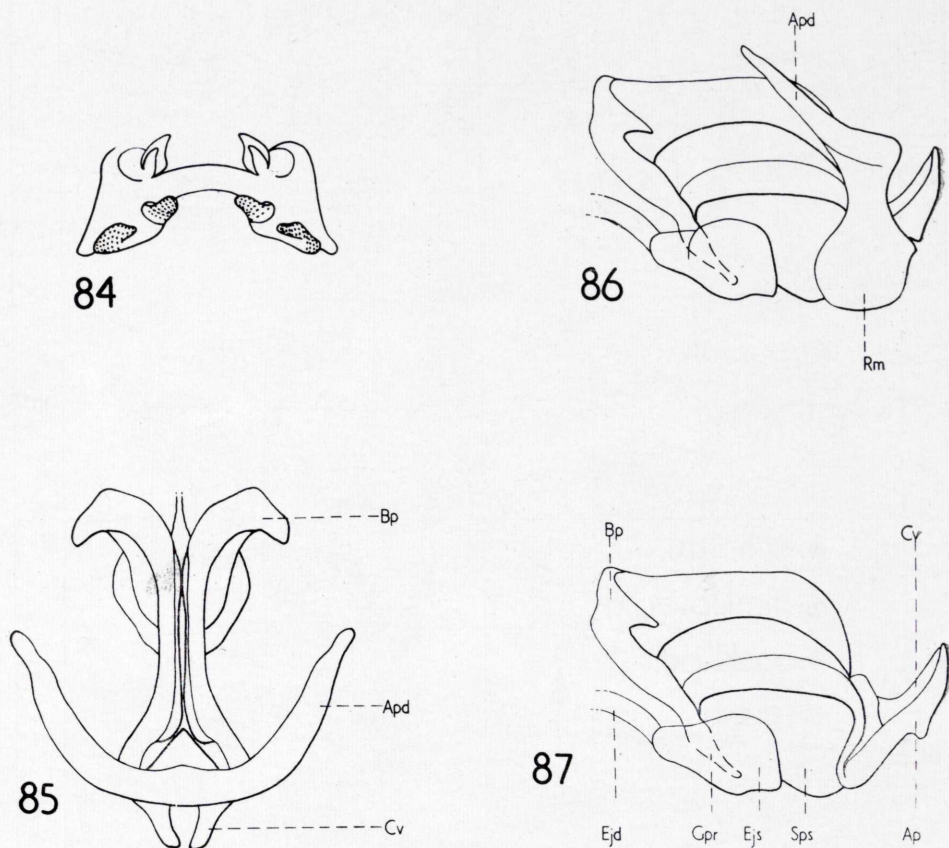
*Redescription.*

♂. Integument rugulose. Antenna as long as head and pronotum together, with twenty-five segments. Fastigium parabolic; fastigial foveolae shallow, rhomboid or oval, with moderately defined margins; frontal ridge flat, sparsely punctate slightly narrowing above. Pronotum moderately broad, lateral carinae divergent in front of first sulcus; metazona much shorter than prozona; posterior margin of pronotum obtusiangular; mesosternal interspace slightly wider than long; metasternal lobes contiguous. Tegmen abbreviated, not extending beyond ninth tergite, often shorter; hind wing lanceolate, two-thirds length of tegmen. Hind femur relatively broad. Inner apical spurs of hind tibia subequal. Phallic complex (figs. 84-87) with basal valves of penis recurved apically.

General coloration varies from light to dark brown with ochraceous and blackish markings. Vertex and dorsum of pronotum often with



median longitudinal ochraceous stripe; lateral carinae of pronotum often ochraceous; outer side of hind femur often with two oblique, dark fasciae which evanesce along a median longitudinal line; hind tibiae ochraceous.



Figs. 84-87.—Phallic complex of *Dnopherula richardsi* (Uvarov). 84) Epiphallus; 85) dorsal view, epiphallus and ectophallic membrane removed; 86) same, lateral view; 87) endophallus, lateral view.

♀. Larger and more robust than male; frontal ridge convex; tegmen strongly shortened, not extending beyond hind margin of third abdominal tergite. Spermatheca with small, finger-like apical and large sac-like pre-apical diverticula.

Length of body, ♂ 10.2-12.5, ♀ 14.3-20.2; pronotum, ♂ 2.4-2.7 ♀ 3.2-3.7; tegmen, ♂ 4.4-5.5, ♀ 4.7-6.2; hind femur, ♂ 7.8-9.1, ♀ 9.4-11.3 (mm.); mean ratio of length to width of hind femur, ♂ 3.75, ♀ 3.63.

The affinities of *D. richardsi* (Uvarov) are given in the discussion of the following species.

Number of specimens examined, 42 ♂, 71 ♀.

Distribution known to author with months of capture.

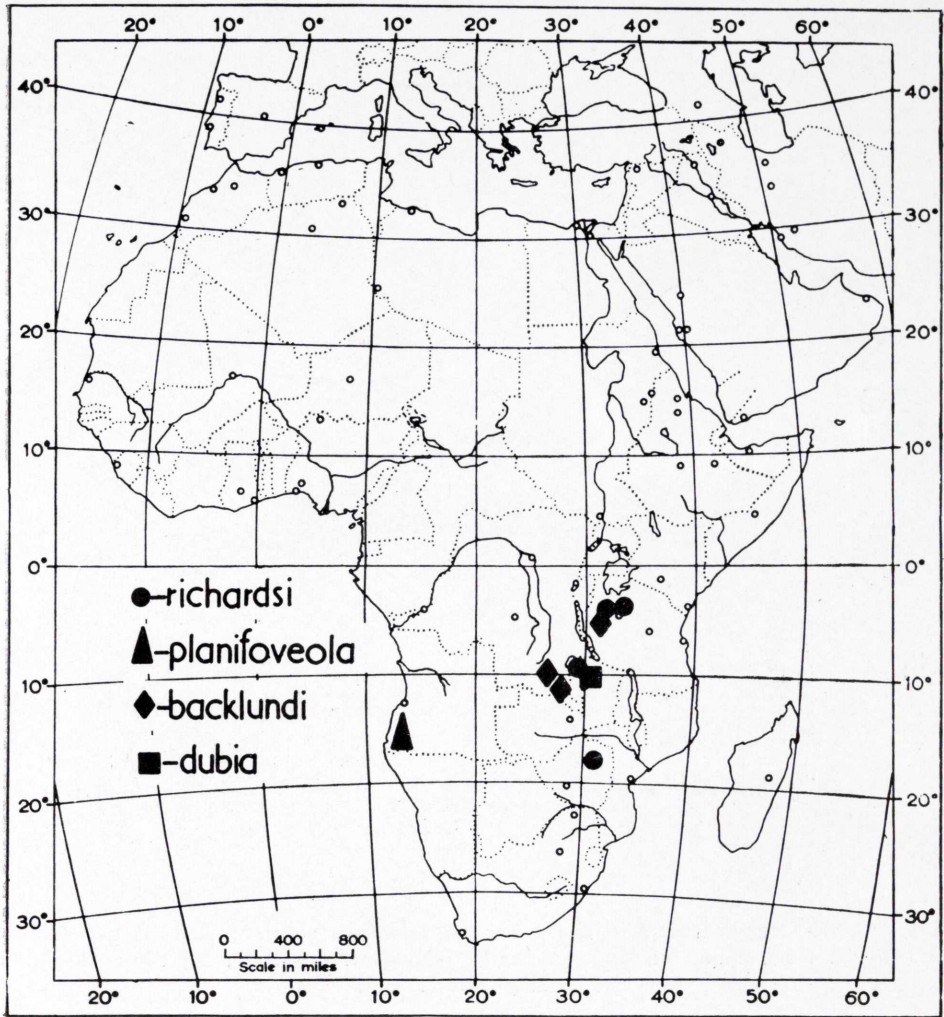


Fig. 88.—Distribution of *Dnopherula* spp.

Tanzania: Mkwemi (Kahama), IX-XII; Kahama, XI, XII; Old Singanga, XI, XII.

Zambia: Mweru Wa Ntipa, VII.

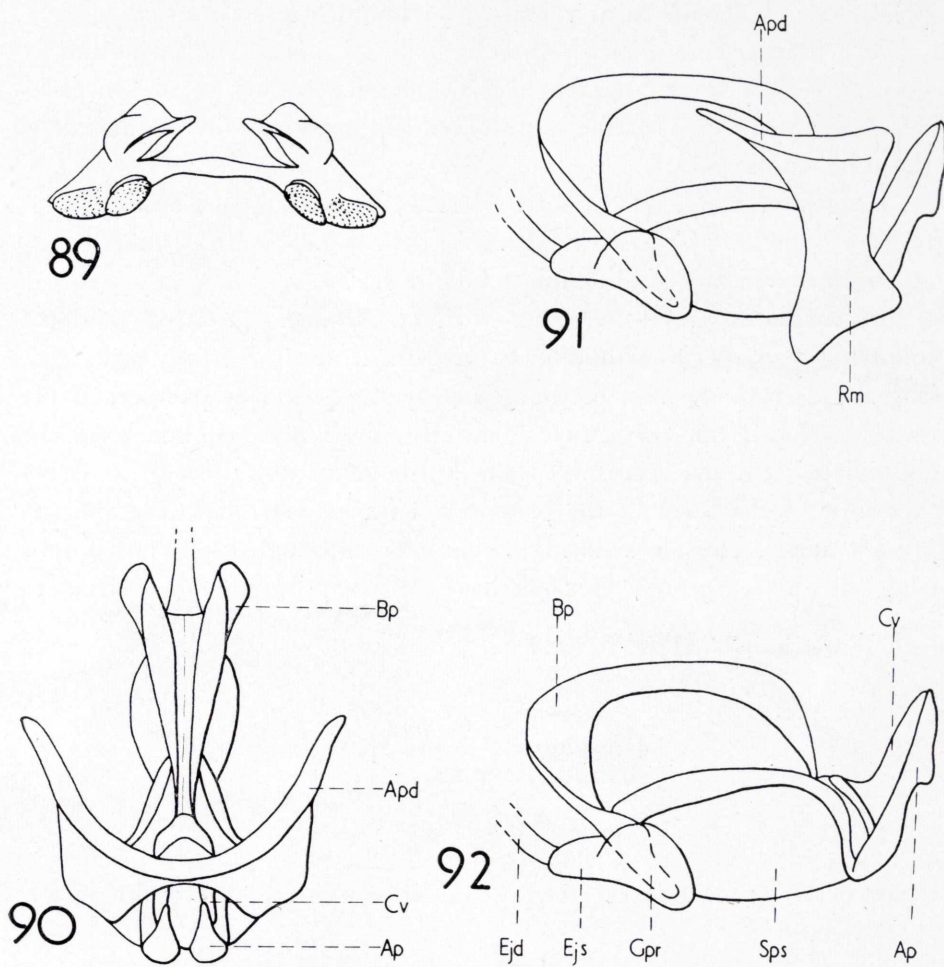
Rhodesia: Salisbury, IV.



***Dnopherula backlund* sp. nov.**

(Figs. 88-92.)

Holotype, ♂, Belgian Congo: Elisabethville, 15.viii.1950 (H. O. Backlund).



Figs. 89-92.—Phallic complex of *Dnopherula backlund* sp. nov. 89) Epiphallus; 90) dorsal view, epiphallus and ectophallic membrane removed; 91) same, lateral view; 92) endophallus, lateral view.

Paratypes, 1 ♂, Tanganyika: Mkwemi, Kahama, 17.xi.1947 (E. Burt);  
1 ♀ Congo: Kinda (Katanga), 22.v.1914 (L. Charliers).

All type material is deposited in the British Museum (Natural History).

♂. Differs from *richardsi* in trapezoid fastigium; less definite fastigial foveolae; frontal ridge of constant width; median carina of pronotum much more sharply defined, posterior margin of pronotum rectangular; hind femur broader; tegmen, although abbreviated, much less so than in *richardsi* with costal area not extending to tip of tegmen; phallic complex with basal valves of penis much less recurved apically.

♀. Larger than male. Antenna as long as head and pronotum together; twenty-seven segmented. Tegmen extending to eighth abdominal segment. Spermatheca unknown as there was only one female in the type series.

Length of body, ♂ 11.6-13.4, ♀ 19.3; pronotum, ♂ 2.5-2.6, ♀ 3.4; tegmen ♂ 5.9-9.9, ♀ 10.4; hind femur, ♂ 8.8-9.4, ♀ 10.1 (mm.); ratio of length to width of hind femur ♂ 3.52, ♀ 3.31.

*D. backlund* sp. n., together with *D. richardsi* (Uvarov) and the following two species would seem to form a natural group easily distinguished from the rest of the genus by the posterior position of the third pronotal transverse sulcus and the shortened tegmina. As the abbreviated tegmina occur elsewhere in the genus it is difficult to assess the value of the form of the pronotum as a generic character and the present author considers that this character, although useful in recognising the species group, does not have sufficient supporting characters to give the group generic status.

### ***Dnopherula dubia* sp. nov.**

(Fig. 88.)

Holotype ♀, N. Rhodesia: Mweru wa Ntipa, Nasma, 30.v.1950 (H. O. Backlund).

Type deposited in the British Museum (Natural History).

♀. Integument rugulose. Antenna missing from type. Fastigium trapezoid; fastigial foveolae trapezoid, moderately deep with well defined margins; frontal ridge convex, narrowing above, sparsely punctured. Pronotum relatively narrow with lateral carinae divergent in front of first sulcus; posterior transverse sulcus placed well behind middle of pronotum; posterior margin of pronotum obtusiangular; mesosternal



interspace wider than long; metasternal lobes punctiformly contiguous. Tegmen strongly abbreviated, extending to hind margin of fourth abdominal tergite, elongate-oval in shape with sub-acute apex. Hind femur relatively narrow; lower inner apical spur of hind tibia much longer than upper spur. Ovipositor with short, curved valves.

♂. Unknown.

Length of body, ♀ 20.7; pronotum, ♀ 4.3; tegmen, ♀ 7.35; hind femur, ♀ 12.8 (mm.); ratio of length to width of hind femur, ♀ 3.76.

This species is also placed in the *richardsi* group and is easily distinguished by the narrow femora and very unequal inner apical spurs of the hind tibia.

### ***Dnopherula planifoveola* sp. nov.**

(Figs. 10, 21.)

Holotype, ♀, Angola: 6 mls. N.W. of Chibia, 20.v.1958, 1500m. (E. S. Ross & R. E. Leech).

Paratype, ♀, same data as Holotype.

The Holotype is deposited in the California Academy of Sciences and the paratype in the British Museum (Natural History).

♀. Integument rugulose. Antenna shorter than head and pronotum together, with twenty-five segments. Fastigium broadly trapezoid; fastigial foveolae very weak and shallow with almost indiscernable margins; frontal ridge flat, moderately wide, of constant width, finely and sparsely punctate. Dorsum of pronotum with lateral carinae slightly but definitely divergent in front of first sulcus; metazona much shorter than prozona; posterior margin of pronotum obtusangular; mesosternal interspace much wider than long; metasternal lobes punctiformly contiguous. Tegmen strongly abbreviated, extending only to posterior margin of fourth abdominal tergite. Hind femur relatively broad; inner apical spurs of hind tibia subequal. Ovipositor normal.

♂. Unknown.

Length of body, ♀ 14.8-15.5; pronotum, ♀ 3.1; tegmen, ♀ 5.4; hind femur, ♀ 9.9 (mm.); ratio of length to width of femur, ♀ 3.09.

General coloration varies in a similar way to other species in the genus. Holotype pale brown with broad black stripe running from behind eyes, along upper half of lateral plate of pronotum and evanescent along anterior margin of tegmen; upper external area of hind femur

with diffuse dark markings; hind tibia very pale pinkish. The paratype is uniformly brown with a pair of dark brown spots on upper outer area of hind femur.

*D. planifoveola* sp. nov., by virtue of the short metazona, is placed in the *richardsi* group but is easily distinguished by the extremely shallow fastigial foveolae and the broad hind femora.

***Dnopherula obliquifrons*** (I. Bolivar, 1912); *Comb. nov.*

(Figs. 7, 22, 93-97.)

*Berengueria obliquifrons* I. Bolivar, 1912: 82.

*Aulacothrus brazzavillei* Sjöstedt, 1931; 15, pl. 2, figs. 4, 5; *syn. nov.*

*Aulacothrus obliquifrons* (I. Bolivar, 1912); Uvarov, 1953: 168.

*Phorenula obliquifrons* (I. Bolivar, 1912); Dirsh, 1958: 29.

Type locality, Congo: Kambove; type depository, Tervuren Museum. Type locality of *brazzavillei* Sjöstedt, Congo (Brazzaville): Brazzaville, Musana; type depository, Stockholm Museum.

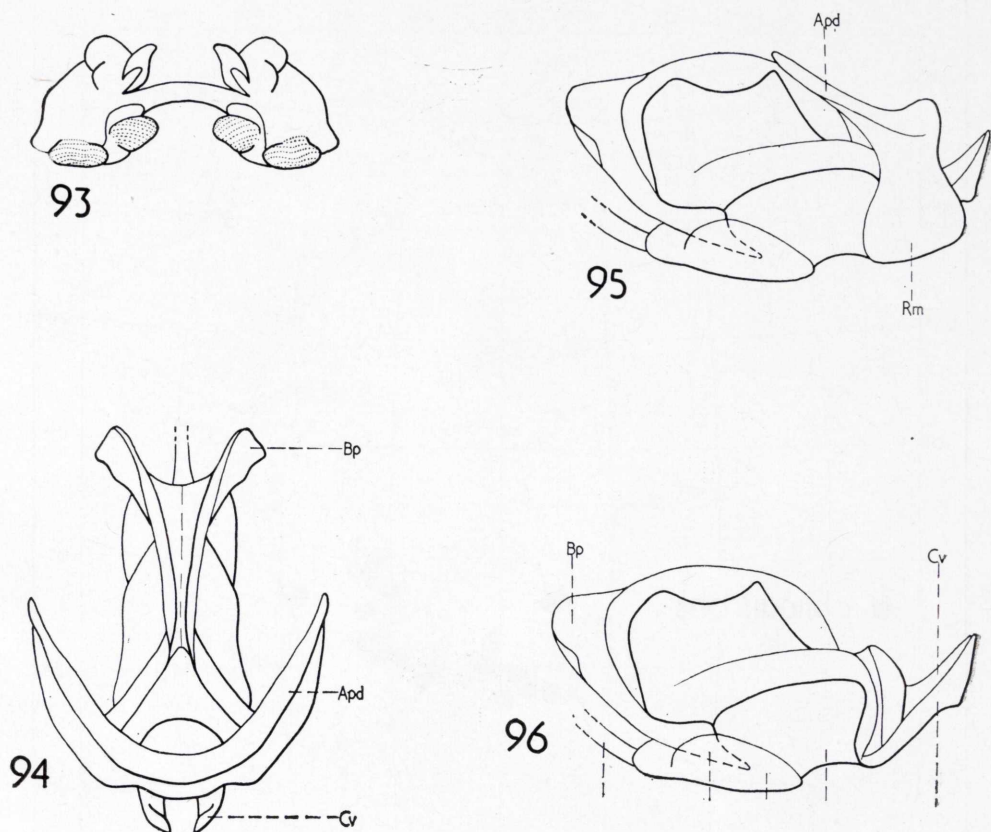
*Redescription.*

♂. Integument rugulose. Antenna longer than head and pronotum together, with twenty-nine segments. Fastigium trapezoid; fastigial foveolae rhomboid, moderately deep with well defined margins; frontal ridge relatively broad, convex, of constant width, sparsely punctate. Dorsum of pronotum with lateral carinae divergent in front of first sulcus; distance between median carina and point where first sulcus crosses lateral carina equal to length of lateral carina in front of first sulcus; metazona as long as prozona; posterior margin of pronotum rectangular; mesosternal interspace as long as or slightly longer than wide; metasternal lobes contiguous. Tegmen semitransparent, exceeding tip of hind femur. Hind femur relatively narrow. Lower inner apical spur of hind tibia much longer than upper spur. Pallic complex (figs. 93-96) with basal valves of penis hardly recurved apically.

General coloration mid brown with ochraceous and dark brown markings, or mottled grey-brown. Dorsum of pronotum often with median longitudinal ochraceous stripe and faint ochraceous criss-cross



pattern; outer side of hind femur with two weak, dark, oblique fasciae which evanesce before reaching lower outer ridge; inner side of hind femur ochraceous with lower area often reddish; hind tibia from reddish to ochraceous to faintly bluish.



Figs. 93-96.—Phallic complex of *Dnopherula obliquifrons* (Bolivar). 93) Epiphallus; 94) dorsal view, epiphallus and ectophallic membrane removed; 95) same, lateral view; 96) endophallus, lateral view.

♀. As male but larger and more robust. Tegmen exceed tip of hind femur to lesser extent. Spermatheca with short apical and large, sac-like pre-apical diverticula.

Length of body, ♂ 15.3-19.1, ♀ 19.1-24.4;; pronotum, ♂ 2.7-3.6, ♀ 3.4-4.5; tegmen, ♂ 12.4-16.0, ♀ 15.3-19.6; hind femur, ♂ 10.6-12.4, ♀ 12.2-16.5 (mm.); mean ratio of length to width of hind femur, ♂ 3.96, ♀ 4.06.

This species is extremely variable in size and general coloration but appears fairly stable in its general structure and morphology.

*D. obliquifrons* (I. Bolivar) was described from a male and female from Kambove and Dirsh (1958: 30) erected the male as the type.

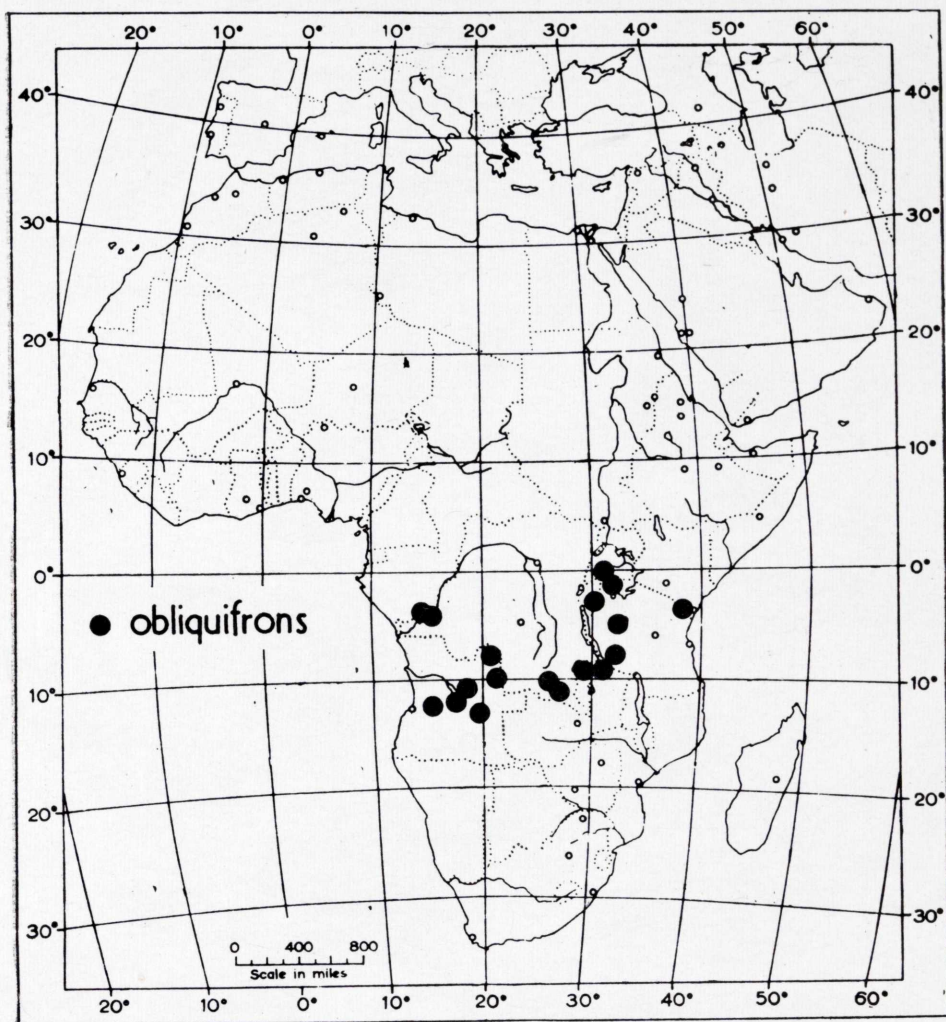


Fig. 97.—Distribution of *Dnopherula obliquifrons* (Bolivar).

*Aulacobathrus brazzavillei* Sjöstedt was described from 5 females from Brazzaville and one male from Musana; one female is labelled as type.

Number of specimens examined, 67 ♂, 64 ♀.

Distribution known to author with months of capture.

Uganda: Masaka Lwengo, V; Ankole Kabula, III.



Kenya Shimba Hills, III.

Congo (Brazzaville): Brazzaville; Musana.

Congo (Leopoldville): Bianco, VIII; Kambove, III, IX.

Urundi: Ruyigi, VI.

Tanzania: Bukoba, VI; Kalula, VIII, IX; Mchemba Plain, VI; Katangala Plain, VI, Mbizi Mt., VIII.

Zambia: Mweru Wa Ntipa, VII, X; Abercorn, VI.

Angola: Bihe, VIII, IX; Dundo, VII; Alto Chicapa, VII; Sombo, VII; Cohemba, VIII; Villa Luso, VI; R. Loweje, V; Langiliko, VI; Mu-Simój Valley, X; R. Lungue Bungu, X; R. Quangu, X.

***Dnopherula cruciata* (I. Bolivar, 1912); *Comb. nov.***

(Figs. 14, 26, 98-102.)

*Phoremula cruciata* I. Bolivar, 1912: 82.

*Phoremula vittata* Uvarov, 1921: 377; *syn. nov.*

*Phoremula gracilis* Uvarov, 1921: 381; *syn. nov.*

*Phoremula aethiopica* I. Bolivar, 1922: 178; *syn. nov.*

*Aulacobothrus calcaratus* Sjöstedt, 1933: 215; *syn. nov.*

*Aulacobothrus aethiopicus* (I. Bolivar, 1922); Uvarov, 1943: 604.

*Aulacobothrus cruciatus* (I. Bolivar, 1912); Uvarov, 1953: 167.

*Aulacobothrus vittatus* (Uvarov, 1921); Uvarov, 1953: 167.

*Aulacobothrus gracilis* (Uvarov, 1921); Uvarov, 1953: 167.

*Phoremula cruciata* I. Bolivar, 1912; Dirsh, 1958: 29.

*Phoremula vittata* Uvarov, 1921; Dirsh 1958: 29.

*Phoremula gracilis* Uvarov, 1921; Dirsh, 1958: 29.

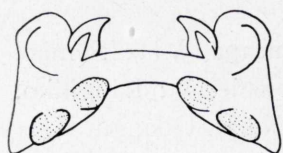
*Phoremula aethiopica* I. Bolivar, 1922; Dirsh 1958: 29.

Type locality, Congo: Bunkeya; type depository, Tervuren Museum; type locality of *vittata* Uvarov, S. Africa: Pretoria; type depository, British Museum (Natural History): type locality of *gracilis* Uvarov, Rhodesia: Salisbury; type depository, British Museum (Natural History): type locality of *aethiopica* I. Bolivar, Ethiopia: Kounhi; type depository, Paris Museum: type locality of *calcaratus* Sjöstedt, Kenya: Mt. Elgon; type depository, Stockholm Museum.

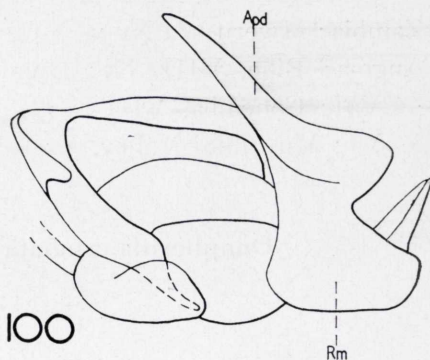
*Redescription.*

♂. Integument rugulose. Antenna slightly longer than head and pronotum together, with twenty-four to twenty-six segments. Fasti-

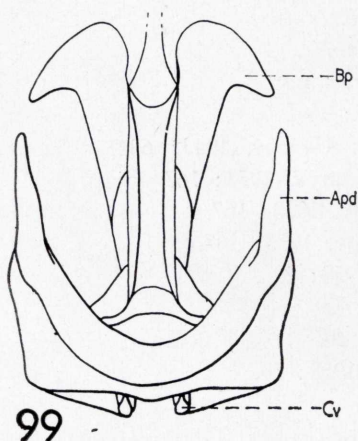
gium parabolic; fastigial foveolae oval or rhomboid, shallow but with well defined margins; frontal ridge convex, moderately narrow, of constant width or very slightly narrowing upwards, finely punctate. Dorsum of pronotum with lateral carinae divergent in front of first transverse sulcus, distance between median carina and point where first



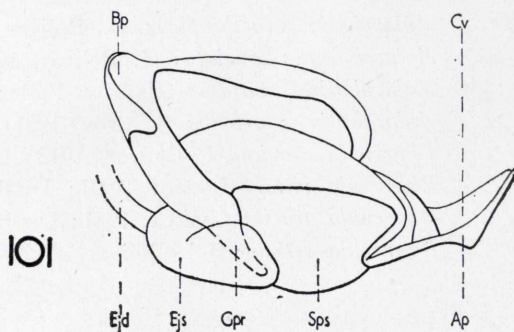
98



100



99



101

Figs. 98-101.—Phallic complex of *Dnopherula cruciata* (Bolivar). 98) Epiphallus; 99) dorsal view, epiphallus and ectophallic membrane removed; 100) same, lateral view; 101) endophallus, lateral view.

transverse sulcus crosses lateral carina less than length of lateral carina in front of first sulcus; metazona as long as prozona; posterior margin of pronotum rectangular; mesosternal interspace as wide as or slightly wider than long; metasternal lobes contiguous. Tegmen semitransparent, exceeding tip of hind femur. Hind femur relatively narrow. Lower inner apical spur of hind tibia much longer than upper spur. Phallic complex (figs. 98-101) with basal valves of penis strongly recurved apically.



General coloration brown with ochraceous and black markings. Vertex and dorsum of pronotum often with median longitudinal ochraceous stripe, occasionally this stripe is so wide on the pronotum as to give the appearance that the lateral carinae are parallel in front of the first sulcus; tegmen mostly with row of black spots in medial area; hind femur with two oblique, dark fasciae on outer side which are closely spaced and evanesce before reaching lower ridge, ochraceous pregenicular band obvious; inner side of hind femur ochraceous with lower area often reddish; hind tibia normally reddish, rarely ochraceous.

♀. As male but larger and more robust. Antenna only as long as head and pronotum together; tegmen only just exceeding tip of hind femur. Spermatheca with short, finger-like preapical and large, sac-like apical diverticula.

Length of body, ♂ 14.5-15.6, ♀ 18.4-22.8; pronotum, ♂ 2.7-3.2, ♀ 3.4-4.0; tegmen, ♂ 11.8-13.3, ♀ 14.6-17.0; hind femur, ♂ 9.5-11.0, ♀ 12.1-14.5 (mm.); mean ratio of length to width of hind femur, ♂ 4.28, ♀ 4.35.

The species here synonymised with *D. cruciata* (I. Bolivar) can only be regarded as colour forms of a variable species. In the original description of *P. aethiopica* I. Bolivar, it is stated that the species was described from a single female but the author has examined a male in the Paris museum bearing I. Bolivar's determination label and also the Rosthschild expedition label which must be regarded as the type.

Number of specimens examined, 341 ♂, 256 ♀.

Distribution known to author with months of capture.

Sudan: Imatong Mts., II, XI, XII; Nagichot (Didinga Distr.), XII.

Ethiopia: Muger Valley, XII; Mt. Chillalo, XI; Lake Zwai, V; Kounhi, IV.

Uganda: Masaka Lwengo, V; Koki Lwanda, VII; Lwengo Buddu, VII; Hoima, I; Mbarara, I; Kapeka, II, III; Busana, III.

Kenya: Kitale; Masai cis Mara, Ol denyo Mesereji, IV; Ol Joroi Orowa Plain, VI; Baringo XII; Mt. Kenya, V; Mt. Elgon; Kapenguria (Turkana), II.

Tanzania: Ufipa, VII; C. Rukwa, IX; Rukwa Valley, X, XI; Tukuyu, VIII, IX; Kalula, IX; Old Shinyanga, I; Mpwapwa, I, II, XI.

Congo (Leopoldville): Bunkeya, X; Bianco, VIII.

Zambia: Nyika Plateau, VIII; Lake Chila (Abercorn), VII; Mweru Wa Ntipa, X.

Angola: Cuilo, VII; Dundo, VIII; Upper Luena River, V; Villa Luso,

VI; R. Langiliko, VI; Busako, VI; Lotembwe Valley, VII; R. Mu-Simoi, IX; Cohemba, VIII; R. Quangu, X; Circa, VIII; R. Lungue Bungu, X; Muhango, IX; Rio Mbali, IX; Kalukembe.

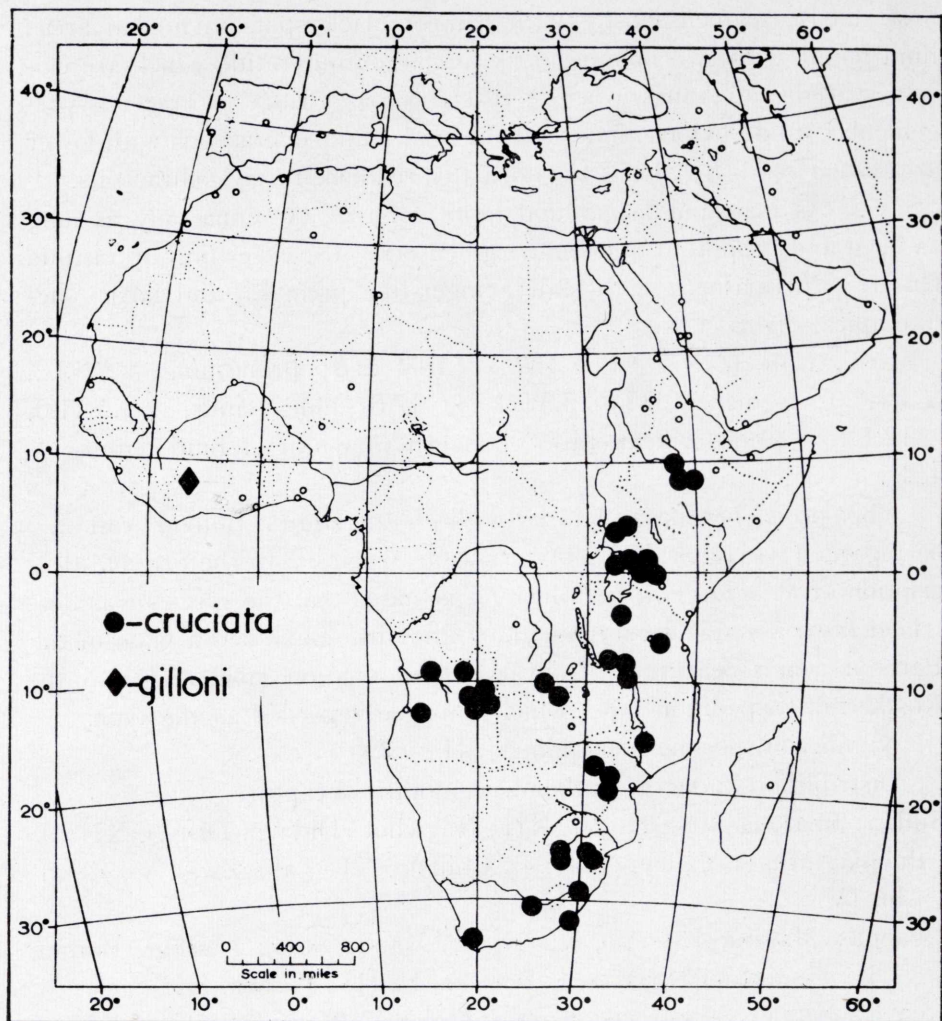


Fig. 102.—Distribution of *Dnopherula* spp.

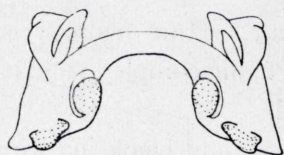
Malawe: Zomba, IX.

Rhodesia: Inyanga Orchards, XI, XII; Salisbury, I, III-VIII, XI, XI; Chimanimani Mts., V; Odzi Distr., VII; Umtali, V; Gazaland, Mahakata R., X.

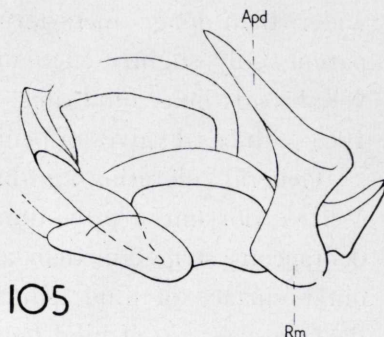
S. Africa: Johannesburg, IV-X; Warm Bath Waterbay; Pretoria, IV,



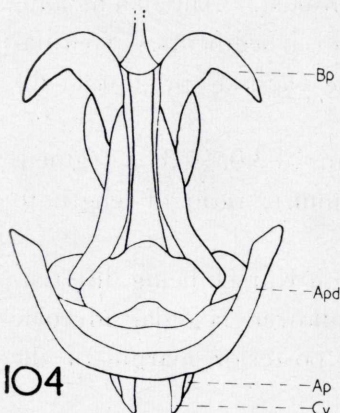
X, XI, Mbabane, X; Witwatersburg, V; Newcastle, VIII; Maritzburg; Port St. John; Pondoland, IV; Van Reenen Drakensburg, XI, XII; Lydenburg, V; Worcester-Paarl, X.



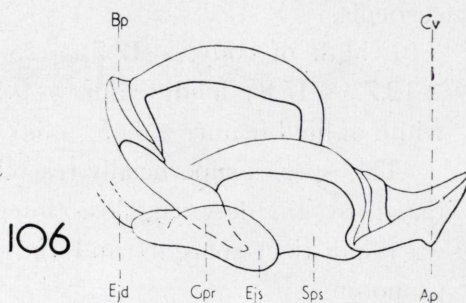
103



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106

Figs 103-106.—Phallic complex of *Dnopherula gilloni* sp. nov. 103) Epiphallus; 104) dorsal view, epiphallus and ectophallic membrane removed; 105) same, lateral view; 106) endophallus, lateral view.

### *Dnopherula gilloni* sp. nov.

(Figs. 20, 102-106.)

Holotype, ♂, Ivory Coast: Séguéla, 25.XII.1964 (Y. Guillon).

Paratype, ♀, same data as Holotype.

Holotype deposited in the British Museum (Natural History).

♂. Integument sub-rugulose, almost smooth. Antennae missing in type. Fastigium of vertex broadly trapezoid; fastigial foveolae

very shallow, oval, with poorly defined margins; frontal ridge convex, of constant width, sparsely punctate. Pronotum relatively narrow, lateral carinae divergent in front of first sulcus; metazona as long as prozona; posterior margin rectangular; mesosternal interspace slightly wider than long; metasternal lobes contiguous. Tegmen semitransparent, only slightly exceeding tip of hind femur. Hind femur relatively broad; inner hind tibial spurs subequal. Phallic complex (fig. 103-106) with basal valves of penis strongly recurved.

General coloration mid-brown with ochraceous and black markings. Vertex, dorsum of pronotum and anal area of tegmen with longitudinal ochraceous stripe; median area of tegmen with broken brown stripe; outer surface of hind femur ochraceous with two incomplete oblique dark fasciae; tip of hind femur black; inner surface of hind femur, and hind tibia ochraceous.

♀. As male but larger and slightly more robust. Antenna as long as head and pronotum together, with twenty-seven segments. Spermatheca with small finger-like apical and large sac-like pre-apical diverticula.

Length of body, ♂ 17.7, ♀ 23.0; pronotum, ♂ 3.0, ♀ 3.6; tegmen, ♂ 12.7, ♀ 15.8; hind femur, ♂ 9.5, ♀ 12.8 (mm.); ratio of length to width of hind femur, ♂ 3.65, ♀ 3.66.

This species superficially resembles *D. callosa* Karsch being differentiated by the less rugulose integument, shallower fastigial foveolae with indistinct margins and the rectangular posterior margin of the pronotum.

### ***Dnopherula invenusta* (Karsch, 1893); *Comb. nov.***

(Figs. 32, 107-110, 115.)

*Pnorisa invenusta* Karsch, 1893: 65.

*Chorthippus (Stauroderus) ypsilon* Karny, 1907: 363, 365; Uvarov, 1926: 431.

*Aulacobothrus invenustus* (Karsch, 1893); Uvarov, 1926: 431.

*Phoremula invenusta* (Karsch, 1893); Dirsh, 1958: 29.

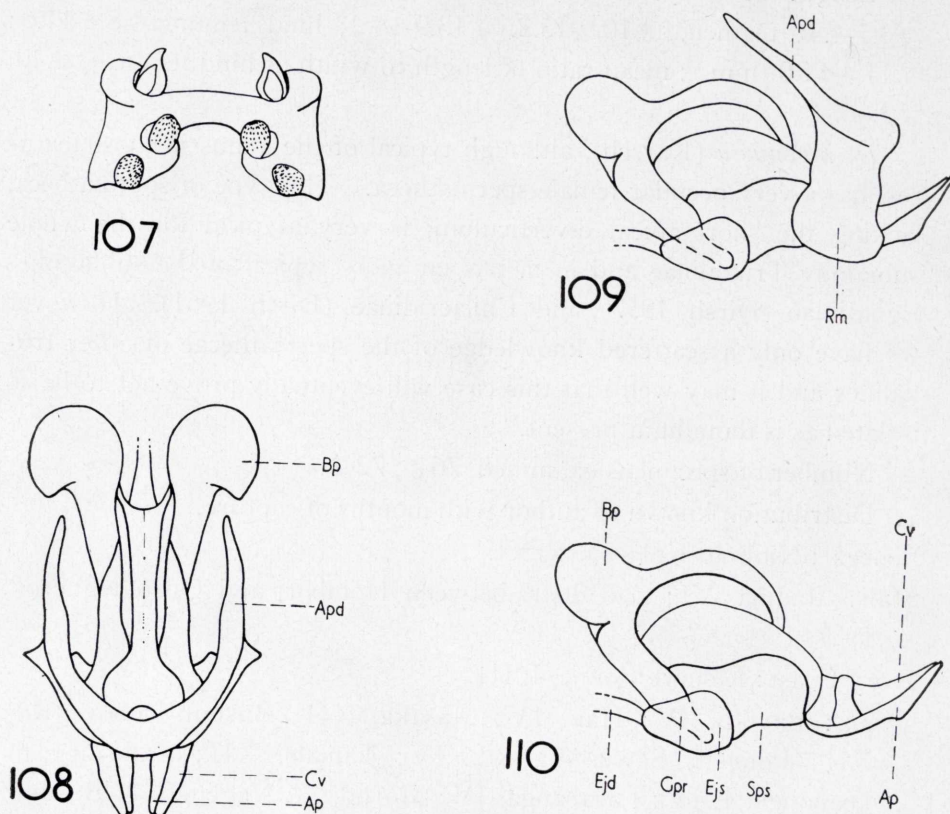
Type locality, Togo: Bismarburg; type depository, Berlin Museum.

Type locality of *ypsilon* Karny, Uganda: Gondokoro; type depository, Vienna Museum.



*Redescription.*

♂. Integument rugulose. Antenna slightly longer than head and pronotum together, with twenty-eight segments. Fastigium narrow trapezoid; fastigial foveolae deep, oval or roundly rectangular, with well defined margins; frontal ridge relatively narrow, flat, narrowing up-



Figs. 107-110.—Phallic complex of *Dnopherula invenusta* (Karsch). 107) Epiphallus; 108) dorsal view, epiphallus and ectophallic membrane removed; 109) same, lateral view; 110) endophallus, lateral view.

wards, finely punctate. Pronotum relatively narrow, lateral carinae parallel or slightly divergent in front of first transverse sulcus; metazona as long as prozona; posterior margin of pronotum rectangular; mesosternal interspace as long wide; metasternal lobes contiguous. Tegmen semitransparent, extending beyond tip of hind femur. Hind femur relatively broad. Inner apical spurs of hind tibia sub-equal. Phallic complex as in figs. 107-110.

General coloration mid brown with ochraceous and dark brown markings. Vertex and dorsum of pronotum occasionally with median longitudinal ochraceous stripe; upper outer area of hind femur with two weak, dark spots, lower inner area reddish; hind tibia reddish in apical three-quarters. Hind wing hyaline with slightly darkened tip.

♀. As male but larger and slightly more robust.

Length of body, ♂ 14.5-17.0, ♀ 18.5-23.5; pronotum, ♂ 2.5-3.6, ♀ 3.5-4.4; tegmen, ♂ 10.9-15.2, ♀ 13.9-18.2; hind femur, ♂ 8.5-11.6; ♀ 11.4-11.0 (mm.); mean ratio of length to width of hind femur, ♂ 3.40, ♀ 3.46.

*D. invenusta* (Karsch), although typical of the genus in most features, has a very peculiar female spermatheca. This type of spermatheca, lacking the short apical diverticulum, is very atypical for the whole subfamily Truxalinae and in fact is far more typical of the subfamilies Egnatiinae (Dirsh 1957) and Chilacridinae (Dirsh 1961). However we have only a scattered knowledge of the spermathecae of other truxalines and it may well be that this case will eventually prove not to be so isolated as is thought at present.

Number of specimens examined, 76 ♂, 72 ♀.

Distribution known to author with months of capture.

Senegal: Niokolo-Koba Park, XI.

Mali: Madina, VI; Gao distr. between Hombori and Ouro Nguerou, IV.

Ivory Coast: Reserve Bouna, I, III.

Ghana: Bawku, IV; Han, IV; Masaka, XII; Busunu-Dobove Rd., XII; Pongeri, Sawia-Wa Rd., IV; Tamale, XII; Kalbruipe, I; Damongo, I, IV; Larabanga, IV; Morno, V; Nagbogo, I; Busunu, V; Bole, IV; Jato's, II; Jema, I; Ejura, I; Shai Hills, VI; Ofankor, II; Keti-Krachi, IV, V, XII; Bame, IV; Ahamansu Hills, XII; Chiare, XII; Amedzofe, I, III, V, XII; Nkwanta-Ahamansu Rd., XII.

Togoland: Blitta, III; Bismarckburg.

Dahomey: Natitingou, III.

Nigeria: Azare, VI.

Cameroun Republic: Makolo, XII; Bosum.

Sudan: Imatong Mts., II, XI; Mongalla, IV; Torit, II; Gondokoro, III; Adachal, XI-I.

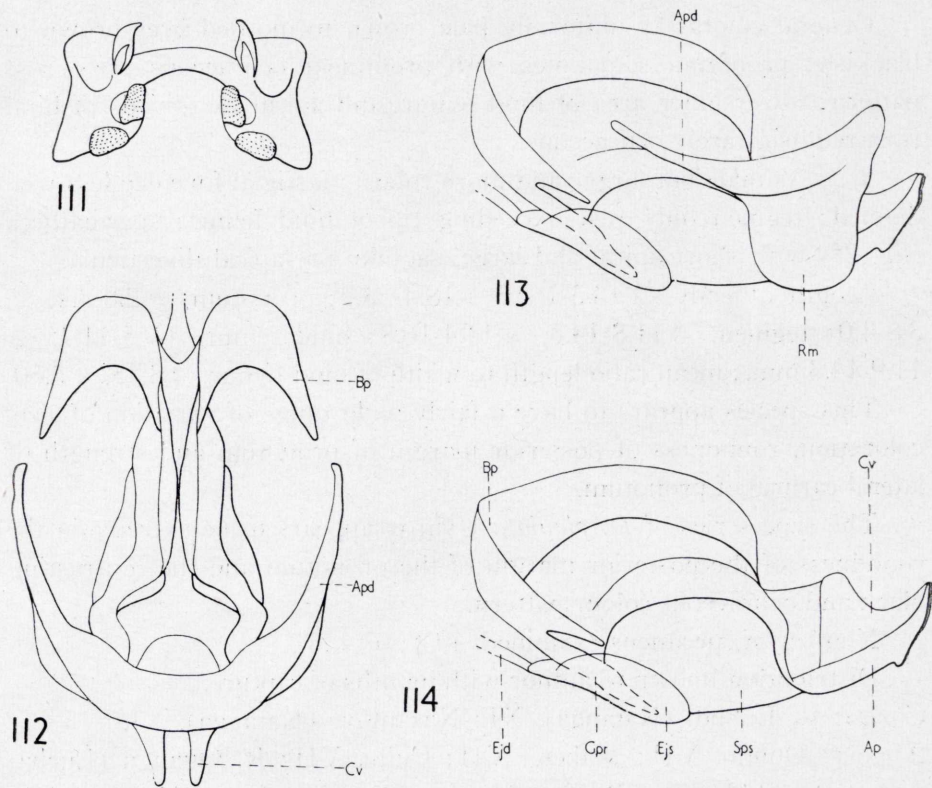


***Dnopherula callosa* Karsch, 1896.**

(Figs. 27, 111-115.)

*Dnopherula callosa* Karsch, 1896: 259.*Dnopherula marshalli* Miller, 1932: 25 figs. 7 A, B; *syn. nov.**Dnopherula plagiata* Uvarov, 1953: 178, figs. 237, 238; *syn. nov.**Phorenula plagiata* (Uvarov, 1953); Dirsh, 1958: 30.

Type locality, ♂, Nyasaland: Milanje; type depository, Berlin Museum. Type locality of *marshalli* Miller, ♂, Rhodesia: Salisbury; type depository, British Museum. Type locality of *plagiata* Uvarov, ♂, Angola: Luchase, R. Quangu; type depository, British Museum.



Figs. 111-114.—Phallic complex of *Dnopherula callosa* (Karsch). 111) Epiphallus; 112) dorsal view, epiphallus and ectophallic membrane removed; 113) same, lateral view; 114) endophallus, lateral view.

*Redescription.*

♂. Integument rugulose. Antenna as long as head and pronotum together; twenty-six segmented. Fastigium parabolic; fastigial foveolae shallow, oval, with moderately defined margins; frontal ridge of constant width, convex, sparsely punctate. Pronotum relatively broad; lateral carinae broadly callose, divergent in front of first sulcus; posterior sulcus crosses median carina at middle of pronotum; posterior margin of pronotum obtusangular, sometimes almost rounded; meso-sternal interspace as wide as long; metasternal lobes contiguous; tegmen slightly transparent, extending slightly beyond tip of hind femur; hind femur relatively broad; inner hind tibial spurs subequal. Phallic complex (figs. 111-114) with basal valves of penis strongly recurved apically.

General coloration uniformly pale brown to mottled grey-brown to blackish; pronotum sometimes with prominent ochraceous criss-cross pattern; lower inner area of hind femur, and apical two-thirds of hind tibia reddish, rarely ochraceous.

♀. As male but larger and more robust; fastigial foveolae less well defined; tegmen only just exceeding tip of hind femur; spermatheca (fig. 27) with short apical and large, sac-like pre-apical diverticula.

Length of body, ♂ 13.3-16.9, ♀ 18.4-23.2; pronotum, ♂ 2.8-3.4, ♀ 3.8-4.0; tegmen, ♂ 11.8-14.5, ♀ 14.4-16.8; hind femur ♂ 9.5-11.4, ♀ 11.9-14.3 mm.; mean ratio length to width of hind femur, ♂ 3.45, ♀ 3.50.

This species appears to have a fairly wide range of variation of size, coloration, roundness of posterior margin of pronotum and strength of lateral carinae of pronotum.

The type series of *D. plagiata* Uvarov appears to be extreme in the roundness of the posterior margin of the pronotum and the contrasting black and ochraceous colour pattern.

Number of specimens examined, 49 ♂, 67 ♀.

Distribution known to author with months of capture.

Congo: R. Lubudi (Katanga), XI; Nasantoye (Katanga), XI.

Angola: Dundo, VII; Mabete, VII; Cuilo, VII; R. Quangu (Luchase), X; R. Lungue Bungu (Moxico), X; Villa Luso (Moxico), VI; Katula (Moxico), V; Circa (Moxico), VIII; Cohemba (Bie), VIII, IX.

Kenya: Emali Range, Sultan Hamud, III.



Zambia: Chisorwe (Luano Valley), I; N. W. Rhodesia.

Malawi: Zomba, IX; Mt. Milanje, XII; Milanje V.

Mozambique: Zambezi Valley, VII.

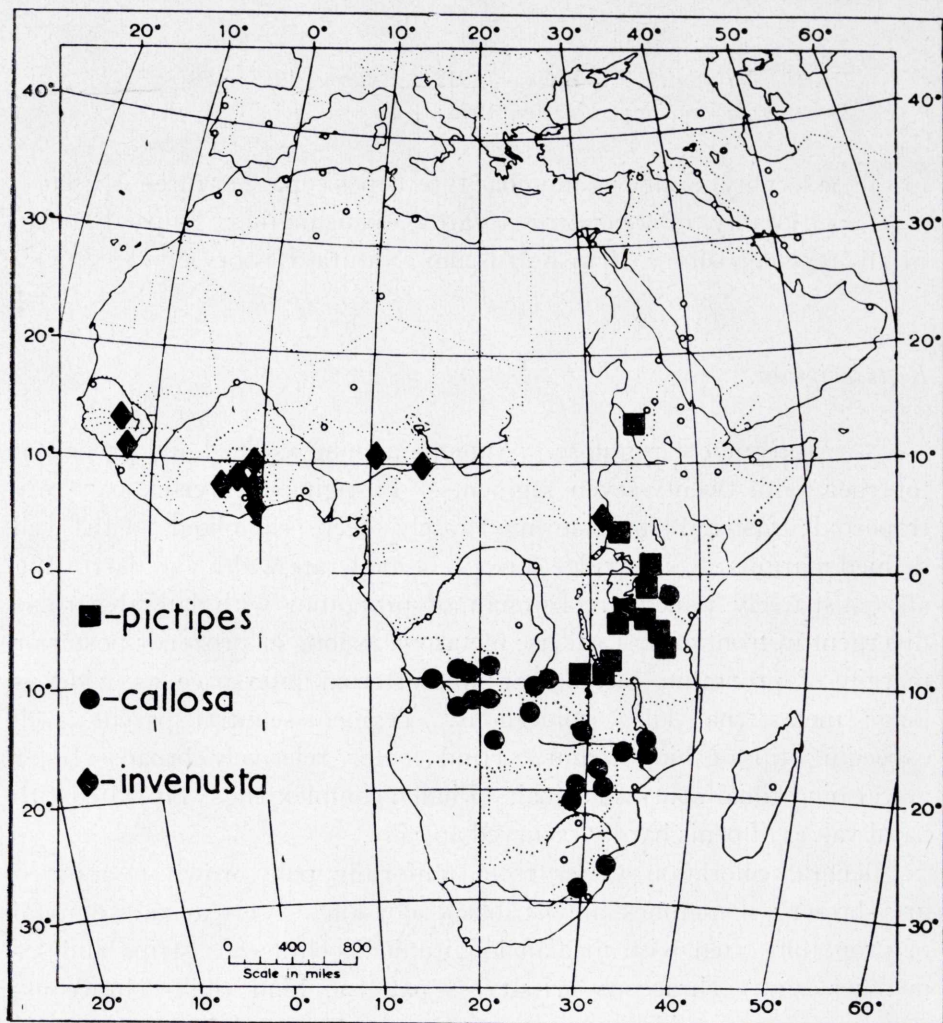


Fig. 115.—Distribution of *Dnopherula* spp.

Rhodesia: Musengesi Valley, IX; Salisbury, III-VIII, XI, XII; Odzi District, V, VII, IX-XI; Mapoto Hills, IV; Shangani, V; Umtali, IX; Mt. Chirinda, X.

South Africa: Ubombo (Zululand), IX; Conjeni (Zululand), IX; Pretoria (Transvaal), X; Colenso (Natal), VIII.



***Dnopherula pictipes* (I. Bolivar, 1912).**

(Figs. 1, 29, 115-119.)

*Ticra pictipes* I. Bolivar, 1912: 80.*Dnopherula pictipes* (I. Bolivar, 1912); Uvarov, 1953: 178.*Dnopherula crucigera* Uvarov, 1953: 178; *syn. nov.*

Type locality, Congo: Kalumba; type depository, Tervuren Museum.

Type locality of *crucigera* Uvarov, Tanganyika: Ufipa Plateau, Mpui; type depository, British Museum (Natural History).*Redescription.*

♂. Integument rugulose. Antenna as long as head and pronotum together, with twenty-seven segments. Fastigium of vertex narrowly trapezoid; fastigial foveolae moderately deep, rhomboid, with well defined margins; frontal ridge convex, of moderate width and narrowing above, sparsely punctate. Dorsum of pronotum with lateral carinae divergent in front of first sulcus; metazona as long as prozona; posterior margin of pronotum rectangular; mesosternal interspace as wide as long; metasternal lobes contiguous. Tegmen semitransparent, well exceeding tip of hind femur. Hind femur relatively broad. Inner apical hind tibial spurs subequal. Phallic complex (figs. 116-119) with basal valves of penis hardly recurved apically.

General coloration varies from uniformly pale brown to mottled grey-brown; sometimes almost black dorsally. Vertex and dorsum of pronotum often with median longitudinal ochraceous stripe and sometimes with ochraceous criss-cross pattern; hind tibia ochraceous-grey, very rarely reddish.

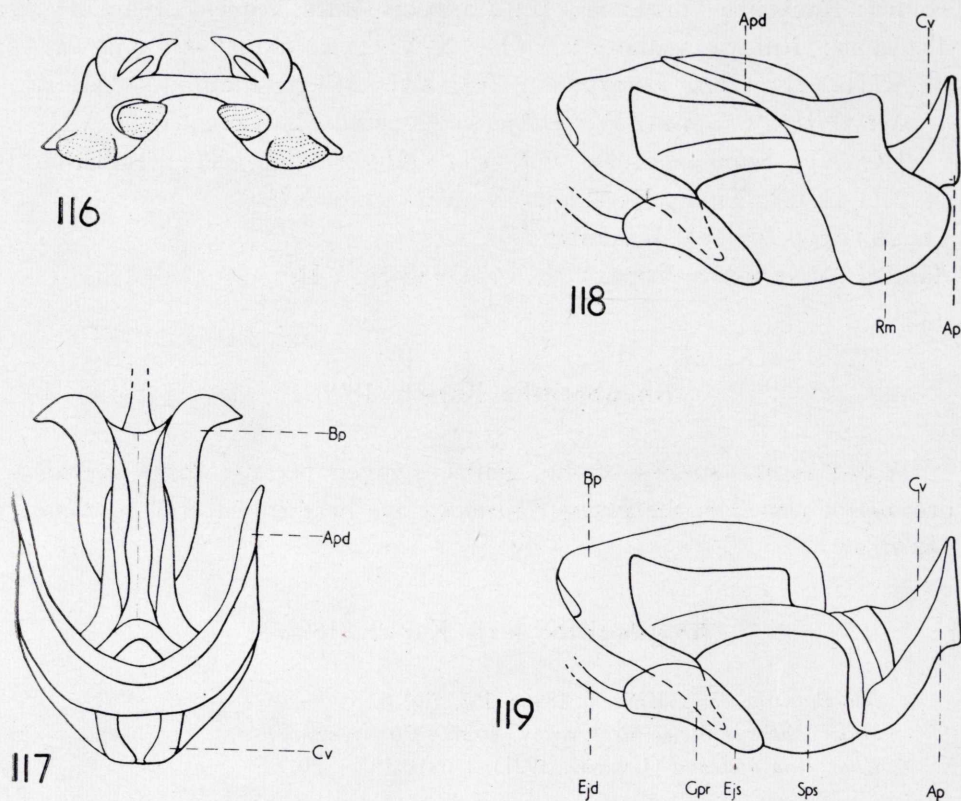
♀. As male but larger and more robust. Fastigial foveolae less well defined. Spermatheca with very small apical and large, sac-like pre-apical diverticula.

Length of body, ♂ 13.9-15.9, ♀ 19.0-23.3; pronotum, ♂ 2.8-3.3, ♀ 3.7-4.2; tegmen, ♂ 11.5-14.4, ♀ 15.9-17.2; hind femur, ♂ 9.7-11.1, ♀ 13.1-14.3 (mm.); mean ratio of length to width of hind femur, ♂ 3.53, ♀ 3.53.

*D. pictipes* (Bolivar) was described from a male from Kalumba



(Congo) and a female from Zambesi Watershed (Rhodesia). The male is here erected as Lectotype. It has not been possible to trace the female but from its locality the present author strongly suspects that it is a female of *D. callosa* Karsch. Uvarov (1953: 178) synonymised



Figs. 116-119.—Phallic complex of *Dnopherula pictipes* (Bolivar). 116) Epiphallus; 117) dorsal view, epiphallus and ectophallic membrane removed; 118) same, lateral view; 119) endophallus, lateral view.

*pictipes* with *callosa* but did not erect a lectotype for *pictipes*. Consequently, as the present author considers the two species distinct, Bolivar's name can be resurrected. Unfortunately in the previous confusion Uvarov (1953: 178) described a new species *crucigera* which the present author considers synonymous with *pictipes* (Bolivar).

*D. callosa* Karsch and *pictipes* (Bolivar) are often confused but they may be easily separated by couplet 17 in the key given on page 275. The two species also appear to be almost completely allopatric (see

fig. 115) although *D. callosa* is known to occur in the Emali Range, Kenya, which is in the middle of the range of *pictipes*.

Number of specimens examined, 87 ♂, 124 ♀.

Distribution known to author with months of capture.

Sudan: Imatong Mts., II; Maya as Subeira-Hawata, II.

Kenya: Kacheliba (Turkana), II; Masai cis Mara, Kipleleo Plain, IV.

Tanzania: Rukwa Valley, V, VII, X-XII; Kafukola (C. Rukwa), VIII-XII; Ufipa Escarpment, XI, XII; Milepa Plain, IX; Mbizi Mt., VIII; Mwanza, IV; Tubugwe, X; Old Shinyanga, I, II, VII-IX, XI; Shinyanga, IV, VI, VII, XI; Singida, XII; Kahama, XII-II, VI; Tinde, II; Kikori, X; Mpwapwa, XI.

Congo (Leopoldville): Kalumba, IX.

Zambia: Mweru Wa Ntipa, VII, X; Abercorn, VII.

### ***Rhaphotittha* Karsch, 1896.**

A list of the species of this genus is given because three species previously placed in the genus *Phorenula* are here transferred to *Rhaphotittha*.

### ***Rhaphotittha levis* Karsch, 1896.**

*Rhaphotittha levis* Karsch, 1896: 257, fig. 8.

*Aulacobothrus africanus* Uvarov, 1921: 370; *syn. nov.*

*Phorenula africana* (Uvarov, 1921), Dirsh, 1958: 29.

### ***Rhaphotittha nyuki* Sjöstedt, 1909.**

*Rhaphotittha nyuki* Sjöstedt, 1909: 156, 168.

*Rhaphotittha meruensis* Sjöstedt, 1909: 156; *syn. nov.*

Syntypes of both species have been examined and can only be regarded as colour forms of one species.

### ***Rhaphotittha reducta* Uvarov, 1941.**

*Rhaphotittha reducta* Uvarov, 1941: 26, fig. 1R.



**Rhaphotittha rhodesiana** (Uvarov, 1953); *Comb. nov.*

*Aulacobothrus rhodesianus* Uvarov, 1953: 168, figs. 225-227.

*Phoremula rhodesiana* (Uvarov, 1953); Dirsh, 1958: 29.

**Rhaphotittha subtilis** Karsch, 1896.

*Rhaphotittha subtilis* Karsch, 1896: 257.

**Rhaphotittha targui** (Chopard, 1941); *Comb. nov.*

*Chorthippus* (*Stauroderus*) *targui* Chopard, 1941: 47, fig. 15.

*Aulacobothrus targui* (Chopard, 1941): Chopard, 1950: 138.

The author has examined the type male of *Rhaphotittha flavipennis* Sjöst. and the following synonymy is made: *Rhaphotittha flavipennis* Sjöstedt 1929: 6 = *Faureia milanjica* (Karsch 1896:258); *syn. nov.*

## EXPLANATION OF LETTERING USED IN FIGURES.

<i>Ap.</i> Apical valve of penis.	<i>Ejs.</i> Ejeculatory sac.
<i>Apd.</i> Apodemus of cingulum.	<i>Gpr.</i> Gonopore process.
<i>Bp.</i> Basal valve of penis.	<i>Rh.</i> Ramus of cingulum.
<i>Cv.</i> Valve of cingulum.	<i>Sps.</i> Spermatophore sac.
<i>Ejd.</i> Ejaculatory duct.	

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